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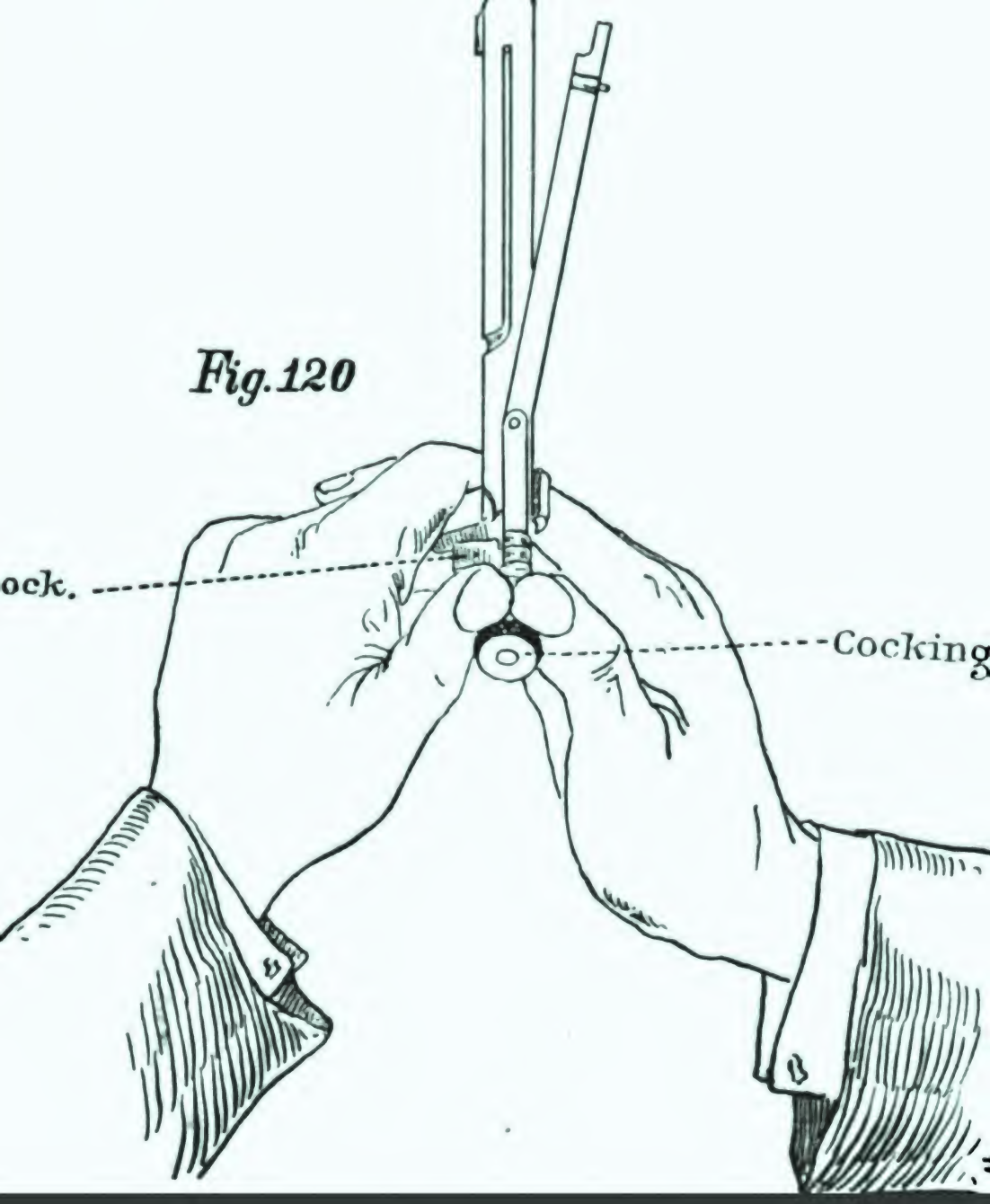

Description and rules for the management of the U.S. ...

United States. Army. Ordnance Dept

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DESCRIPTION

AND

RULES FOR THE MANAGEMENT

OF THE

U. S. MAGAZINE RIFLE

AND CARBINE.

CALIBRE .30.

(Three Plates.)

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1898.

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Fig. 1.

Fig. 2.

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U. S. Magazine Rifle and Carbine.

Since the adoption of this arm the following changes have been made by the authority of the Chief of Ordnance:

BARREL.—Muzzle rounded in Model 1896.

BAYONET BLADE.—Blueing stopped April 1, 1895.

BAYONET SCABBARD HOOK.—Oscillation limited to 100°, April 17, 1897.

BAYONET SCABBARD MOUTHPIECE.—Aperture for blade made rectangular, July 15, 1895.

BOLT.—About one-fourth of left side of guide rib removed, June 17, 1895.

Slot for securing stud omitted, June 29, 1895.

Length of flat surface on underside of handle increased in Model 1898.

BUTT PLATE.—Thickness increased 0″.04, toe curved, cap hole and spring lug added in Model 1896.

BUTT PLATE CAP, CAP PIN, CAP SPRING, AND CAP SPRING SCREW.—Added in Model 1896.

BUTT PLATE SCREW, LARGE.—Head made flat in Model 1896.

CARRIER.—Magazine Spring lug shortened, March 4, 1895.

Arbor made perpendicular to top and shortened 0″.02, and distance between lug and bottom side of body decreased 0″.02 in Model 1898.

COCKING PIECE.—Made of high instead of low steel, August 1, 1895.

Rear part of lug beveled and locking notch added in Model 1896.

CUT-OFF.—Blued instead of spring tempered, July 15, 1895.

Thickness of thumb-piece increased 0″.015 and slot for flat spring replaced by spring spindle hole, April 30, 1895.

Flatting of spindle reversed, length of spindle decreased 0″.5, rear upper edge of thumb-piece beveled and fillet added at junction of spindle and thumb-piece in Model 1898.

CUT-OFF SPRING.—Flat replaced by spiral pattern, April 30, 1895.

CUT-OFF SPRING SPINDLE.—Added, April 30, 1895.

Length increased 0″.013, August 6, 1895.

EJECTOR PIN.—Head rounded and length increased, January 28, 1895.

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EXTRACTOR.—Depth of extractor spring pivot hole increased 0″.028, September 3, 1895.

Extractor pin lug added in Model 1896.

Fillet added at junction of underside of body and heel, January 25, 1896.

EXTRACTOR SCREW.—Replaced by Extractor Rivet in Model 1896.

EXTRACTOR PIN.—Added in Model 1896.

FRONT SIGHT STUD.—Width of slot reduced to 0″.05 in Model 1896.

FRONT SIGHT.—Height of top above axis of bore increased from 0″.82 to 0″.85, June 20, 1894. Thickness made 0″.05 throughout, and shape of top changed in Model 1896.

FRONT SIGHT PIN.—Length increased and taper changed in Model 1896.

GATE.—Length of lug reduced 0″.0065, April 1, 1895. Fillet added at junction of lug and hinge, October 8, 1895.

Shape of exterior and interior of front end changed, October 8, 1895.

Curvature of exterior and shape of interior at rear end changed, and the bevel on the front part of the interior of the top omitted in Model 1898.

GUIDE LIP.—Tenon to enter groove in receiver omitted, Sept. 8, 1894. Thickness increased in Model 1896.

HAND GUARD BODY.—Extended rearward over tenon of receiver and heads of rivets countersunk deeper in Model 1896.

HAND GUARD RIVETS, FRONT AND REAR.—Shortened in Model 1896.

HAND GUARD SPRINGS.—Crimp omitted in Model 1896.

HINGE BAR PIN.—Blued instead of spring tempered, July 15, 1895.

HINGE BAR HEAD.—Rear right edge rounded, May 11, 1895.

Fillet added at junction of spring and head, June 4, 1895.

Width of lug on spring reduced 0″.03, Jan. 30, 1896.

MAIN SPRING.—Length increased from 30½ to 33½ coils, in Model 1896. Weight reduced from 18 to 22 pounds to 16 to 18 pounds in Model 1898.

RAMROD.—Omitted in Model 1896.

RAMROD STOP.—Omitted in Model 1896.

CLEANING ROD.—Made jointed and inserted in butt of stock in Model 1896.

REAR SIGHT.—Model 1892 became obsolete and Model 1896 adopted Nov. 26, 1895.

Graduations corrected by experimental firing, June, 1898.

REAR SIGHT BASE SCREW, FRONT.—Body reduced in length 0″.01, end made flat and thread cut nearer head in Model 1896.

Made identical with the Carbine rear sight base screw, front, July 1, 1898.

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REAR SIGHT BASE SCREW, REAR.—Body reduced in length 0″.01, end made flat and thread cut nearer head in Model 1896.

REAR SIGHT JOINT SCREW.—Tenon for thread increased in length in Model 1896.

RECEIVER.—Groove for guide lip tenon omitted, Sept. 8, 1894.

Slot for ejector pin head omitted, Jan. 28, 1895.

Walls of trigger heel slot omitted, May 27, 1895.

Depth of cut-off spring spindle recesses increased, Oct. 15, '95.

Extractor pin notch added in Model 1896.

The following changes were embodied in the Model 1898, viz:

Cut-off hole reduced 0″.5 in depth and position slightly changed.

Width of mortise for side plate tenon increased 0″.02.

That part of the bolt handle seat projecting beyond tang omitted.

Outside of right wall over gate beveled.

Bearing for top side of carrier, in carrier arbor cavity, lowered 0″.02.

That part of the left wall of the magazine spring channel projecting beyond the bottom wall omitted.

Mark on side of tenon for position of barrel omitted.

Top of carrier arbor ear lowered to project only slightly above top of gate.

Bottom of magazine spring channel made parallel to bottom of magazine.

SAFETY LOCK.—Thickness of thumb-piece increased; thumb-piece and spindle made separate, and spring and spring spindle added in Model 1896.

SAFETY LOCK SPINDLE.—Depth of safety lock pin groove in Model 1892 reduced: (see sleeve). The spindle with deep groove is known as Model 1892, 2nd pattern; and with the shallow groove, as Model 1892, 3rd pattern.

SAFETY LOCK PIN.—Omitted in Model 1896.

SEAR.—Made of low instead of high steel, Oct. 25, 1895.

Nose shortened 0″.005, Nov. 26, 1895.

SIDE PLATE.—Hole for ejector pin head added, Jan. 28, 1895.

Thickness of upper half increased and cartridge rib lengthened, in Model 1896.

Thickness of tenon increased 0″.02 in Model 1898.

SIDE PLATE SCREW.—Shortened in length one thread, June 1, 1894.

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SLEEVE.—Safety lock pin hole raised 0″.03, Oct. 22, 1894.

The sleeve with low safety lock pin hole is known as Model 1892, 1st pattern, and with high hole as Model 1892, 2nd pattern.

Securing stud and rivet omitted, June 29, 1895.

Knurling omitted, June 15, 1895.

The following changes were embodied in the Model 1896:—

Safety lock pin hole omitted.

Front end of barrel shortened 0″.0345.

Thickness of extractor arm reduced 0″.035.

Countersink for screw head omitted, and lower part of rivet hole countersunk for rivet head.

Groove with a recess at each end added for safety lock spring spindle.

STOCK.—Changes embodied in Model 1896:—

Small enlarged.

Toe rounded.

Two holes, 1″ in diameter, to decrease the weight, and three small holes for cleaning rod drilled in butt.

Oiler seat cut between large holes.

Channels cut under barrel to decrease the weight.

Ramrod groove and stop slot omitted.

Bolt handle seat changed in Model 1898.

STRIKER.—Point rounded, Dec. 2, 1895.

TRIGGER.—Case-hardened in water instead of in oil, April 2, 1894.

TRIGGER PIN.—Length reduced 0″.045, Nov. 15, 1895.

UPPER BAND.—Middle portion over barrel removed, Aug. 16, 1894.

Bushing for ramrod omitted in Model 1896.

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COMPONENT PARTS OF RIFLE.

99 IN NUMBER.

Barrel:
- Barrel.
- Front Sight Stud.

Bolt.
Butt Plate.
Butt Plate Cap.
Butt Plate Cap Pin.
Butt Plate Cap Spring.
Butt Plate Cap Spring Screw.
Butt Plate Screw, large.
Butt Plate Screw, small.
Butt Swivel.
Butt Swivel Pin.
Butt Swivel Plate.
Butt Swivel Plate Screws (2).
Carrier.
Cleaning Rod, 1st section.
Cleaning Rod, 2nd and 3rd sections.
Cut-Off.
Cut-Off Spring.
Cut-Off Spring Spindle.
Ejector.
Ejector Pin.
Extractor.
Extractor Pin.
Extractor Rivet.
Extractor Spring.
Firing Pin:
- Cocking Piece.
- Firing Pin Rod.

Follower.
Follower Pin.
Front Sight.
Front Sight Pin.
Gate.
Guard.
Guard Screw, front.
Guard Screw, rear.
Hand Guard:
- Hand Guard Body.
- Hand Guard Rivets, front (2).
- Hand Guard Rivets, rear (2).
- Hand Guard Spring, front.
- Hand Guard Spring, rear.

Hinge Bar:
- Hinge Bar Head.
- Hinge Bar Pin.

Lower Band.
Lower Band Pin.
Lower Band Swivel.
Lower Band Swivel Screw.
Magazine Spring.
Main Spring.
Rear Sight Base.
Rear Sight Base Screw, front.
Rear Sight Base Screw, rear.
Rear Sight Base Spring.
Rear Sight Joint Screw.
Rear Sight Leaf.
Rear Sight Slide.
Rear Sight Slide Cap.
Rear Sight Slide Cap Screw.
Rear Sight Slide Pin.
Rear Sight Slide Screw.

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Rear Sight Slide Spring.
Receiver:
- Receiver.
- Guide Lip.
- Guide Lip Rivet.

Safety Lock:
- Safety Lock Spindle.
- Safety Lock Spring.
- Safety Lock Spring Spindle.
- Safety Lock Thumb Piece.

Sear.
Sear Spring.
Side Plate.
Side Plate Screw.
Sleeve.
Stacking Swivel.
Stacking Swivel Screw.
Stock.
Striker.
Trigger.
Trigger Pin.
Upper Band.
Upper Band Screw.
Bayonet:
- Bayonet Blade.
- Bayonet Catch.
- Bayonet Catch Nut.
- Bayonet Catch Spring.
- Bayonet Grip, Body, right.
- Bayonet Grip, Body, left.
- Bayonet Grip, Rivets (2).
- Bayonet Grip, Washers (4).
- Bayonet Guard.
- Bayonet Pommel.

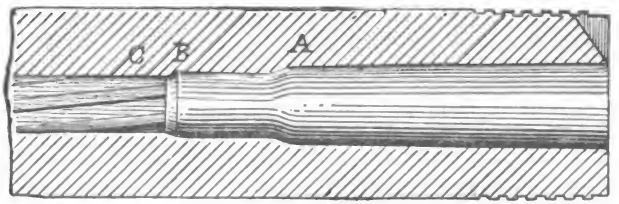
Fig. 3.

DESCRIPTION
AND NOMENCLATURE OF RIFLE.

The BARREL, Fig. 3, has the *muzzle*, A, rounded to protect the rifling; *front sight stud* and *front sight pin hole*, B; *rear sight screw holes*, C; *tenon*, D, on which is a thread for securing the receiver to the barrel; and the *face*, E, which supports the rim of the cartridge case. The *chamber*, Fig. 4, is made slightly conical to facilitate the withdrawal of the cartridge case and has two contractions, the rear one, A, called the *shoulder*, and the front one, B, the *throat*; immediately in front of the throat the bore is enlarged to form the *bullet seat*, C. The rifling begins in the throat. A *slot*, D, is cut in the rear end of the barrel to receive the extractor hook. The *muzzle* and the *front sight stud* are shown in Fig. 5. The stud is brazed to the barrel in manufacture; the slot, E, is the *front sight seat*.

Fig. 5.

Fig. 4.



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The RECEIVER is shown in Figs. 6 and 7. The hole, A, called the *well*, receives the bolt. The *magazine*, B, holds five cartridges; it is beneath the *well*, with which it is connected by the *magazine channel*, C, shaped to properly direct the passage of the cartridge from the magazine into the chamber. The *ramp*, D, and the corresponding ramp on the side plate guide the bullet into the chamber. The *left wall*, E, is continuous and guides the bolt and extractor when moved backward and forward. Part of the right wall is cut away for the bolt lugs, to allow the ejection of the empty cartridge case, and the loading when the arm is used as a single loader. The inside of the right wall is cut away to permit the free passage of the locking lug and to receive the guide rib of the bolt when the latter is closed. The front end, F, of the rear part of the right wall is the *locking shoulder*, and the rear end, G, the *cocking shoulder;* the upper parts of these shoulders are helicoidal cams. The opening between the two walls admits the extractor, guide rib and locking lug of the bolt and the extractor arm of the sleeve, and also prevents the latter from rotating with the bolt. The *cut-off recess*, H, has two small grooves in which the cut-off spring spindle works; the *cut-off hole*, I, extends from the front end of the recess forward, over the magazine channel. Other parts are the *bolt handle seat*, J; the *locking lug recess* K, with its shoulder and cam; the *ejector seat*, L; the *cocking piece groove*, M; the *sear nose slot*, N; the *side plate tenon mortise*, O; the *guide lip*, P, riveted to the receiver in manufacture by the *guide lip rivet;* the *extractor spring lip*, Q; the *hinge bar holes*, R; the *magazine spring channel*, S; the *carrier arbor hole*, T; the *sear seat hole*, U; the *side plate screw hole*, V; *the ejector pin hole*, W; the *extractor pin notch*, X; the *trigger heel bearing*, Y; the *hinge bar spring seat*, Z; the

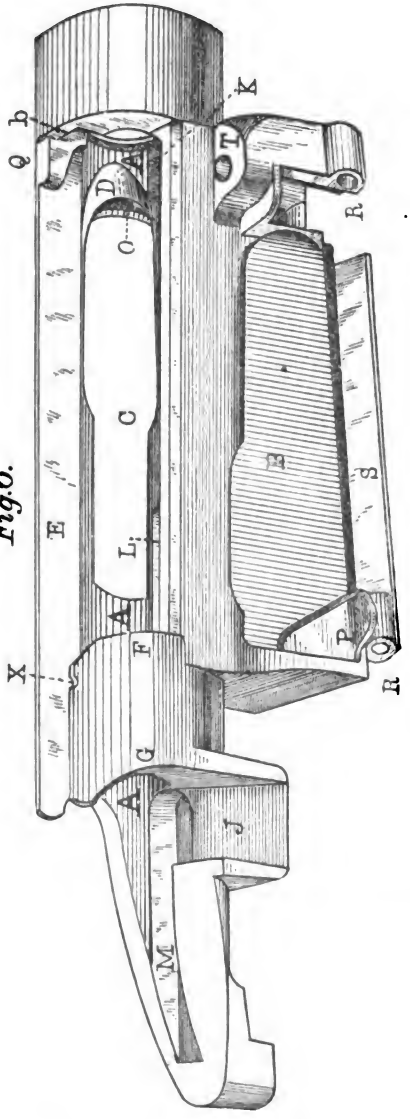

Fig. 6.

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guard screw holes, **a**; and the *extractor hook slot*, **b**, which, with the corresponding slot in the barrel, receives the extractor hook. The prolongation of the well in front of the locking lug recess is enlarged and tapped to receive the tenon of the barrel. When the receiver is properly assembled on the barrel, the radial mark on the front end of the receiver should be in juxtaposition with the corresponding mark on the right side of the barrel. The model, place of manufacture, and number of the arm are stamped on the left wall.

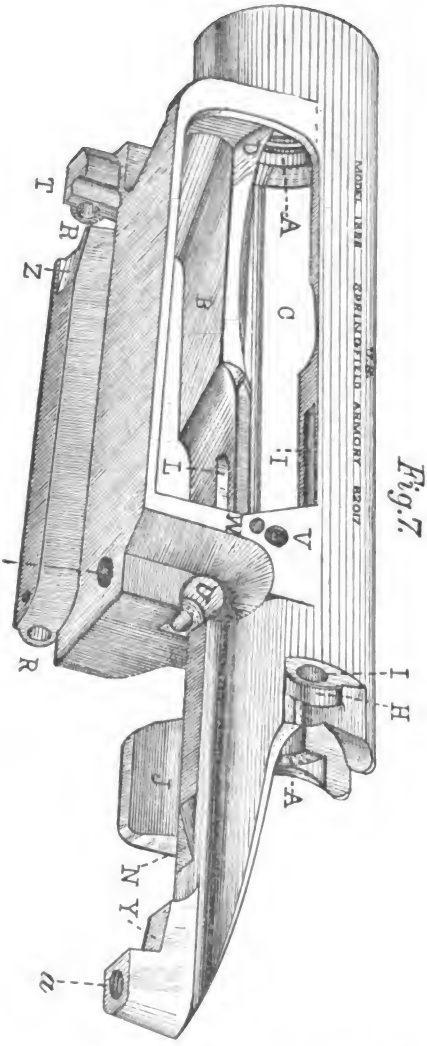

Fig. 7.

The BOLT is represented in Fig. 8, side view; Fig. 9, rear view; and Fig. 10, front view. It consists of the *handle*, A, the outer end of which is a ball; the *collar*, B, the front end of which is undercut to fit the sleeve (see Fig. 10); the *guide rib*, C, which directs the longitudinal motion of the bolt and extractor; the *locking lug*, D, which sustains the shock of discharge; the *ejector groove*, E, extending along and partly around the bolt; the *cocking cam*, F; the *cocking nose notch*, G; and the *safety lock spindle notch*, H. The *firing pin hole*, I, is cylindrical except at the front end where it is contracted to conform to the shape of the front end of the striker; in rear of this contraction is a hole, J, for the escape of gas entering the well

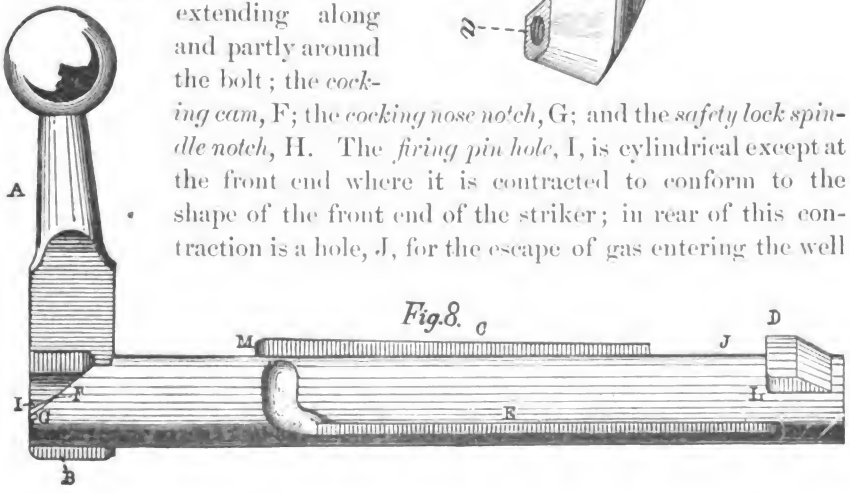

Fig. 8.

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Fig. 9.

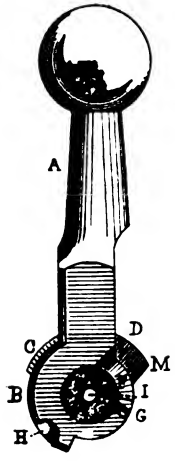
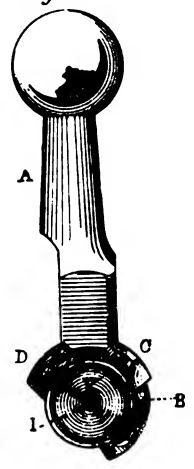


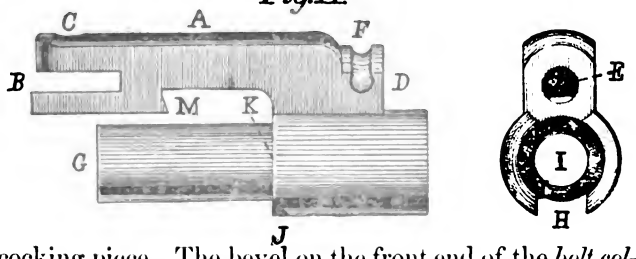
Fig. 10.



from a pierced or leaky primer. The *front face*, K, of the bolt is countersunk to receive the head of the cartridge case. The corners, L and M, are beveled to form cams.

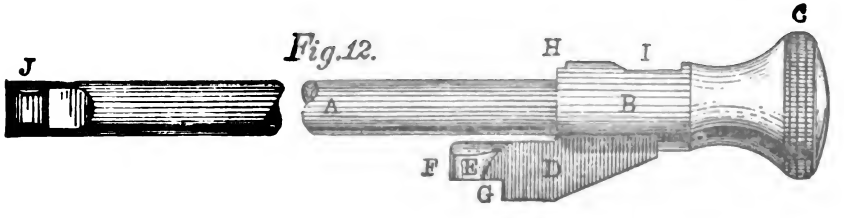
The SLEEVE, Fig. 11, has the *extractor arm*, A; the *extractor slot*, B; the *extractor rivet hole*, C, that part below the slot being enlarged to receive the head of the extractor rivet; the *safety lock seat*, D; the *safety lock spindle hole*, E; the *safety lock spring spindle groove*, F, the ends of which are deepened to retain the safety lock when turned to the right or left; the *barrel*, G, which enters the firing pin hole in the bolt and of which the front end forms the rear bearing for the main spring; the *cocking piece lug slot*, H; the *hole*, I, through which the firing pin passes, and the *dust space*, J, which permits the escape of dust from the cocking cam recess of the bolt. The exterior shoulder, K, at the rear end of the *barrel*, bears against the rear end of the bolt and the interior shoulder, L, limits the forward movement of the cocking piece. The bevel on the front end of the *bolt collar recess*, M, fits the undercut on the front end of the bolt collar and holds the sleeve on the bolt, allowing the latter to rotate without the former.

Fig. 11.



The FIRING PIN, Fig. 12, consists of the *firing pin rod*, A, and of the *cocking piece*, B, which are made separately and the former screwed into the latter and riveted in assembling; the length of the rod being so adjusted that, when the front end of the cocking piece bears against the

Fig. 12.



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interior shoulder, L, of the sleeve, the striker point will project the proper distance beyond the face of the bolt. Other parts are *comb*, C; *lug*, D; *cocking cam*, E; *nose*, F; *sear notch*, G; *safety lock cam*, H; *locking notch*, I; and *striker point*, J.

Fig.15.

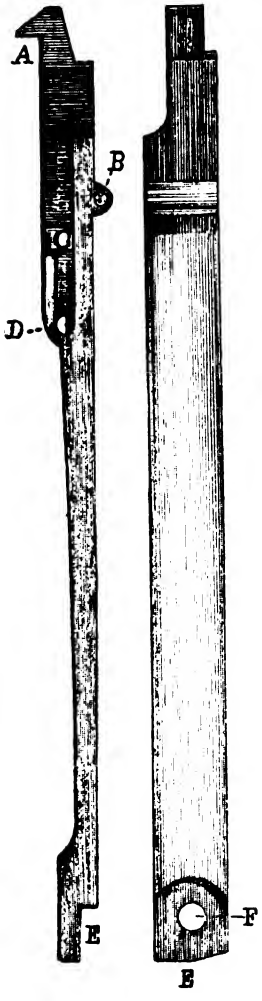
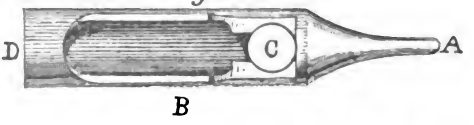


Fig.13



The parts of the STRIKER, Fig. 13, are the *point*, A; the *body*, B, partly cut away to permit the assembling of the firing pin; and the *joint hole*, C, by which the striker is secured to the firing pin; its rear end, D, forms the front bearing for the main spring.

Fig. 14.

The MAIN SPRING is shown in Fig. 14.

The EXTRACTOR, Fig. 15, has the *hook*, A; the *extractor pin hole*, B; the *seat*, C, and the *stud hole*, D, for the extractor spring; the *heel*, E; and the *extractor rivet hole*, F.

The EXTRACTOR PIN, Fig. 16, is tapering and is driven into its hole in the extractor from the right, and its small end then upset.

The EXTRACTOR SPRING, Fig. 17, has the *stud*, S, and the *point*, P.

The EXTRACTOR RIVET, Fig. 18, holds the extractor in the sleeve.

The EJECTOR, Fig. 19, has the *heel*, A; the *pin hole*, B; and the *point*, C, which, resting on a shoulder in the ejector slot in the receiver, prevents the front end of the ejector from dropping into the magazine.

The EJECTOR PIN, Fig. 20, on which the ejector is pivoted, has a knob on its left end by which it can easily be withdrawn from the receiver.

Fig.18

Fig.17

Fig.16.

Fig.19.

Fig.20.

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The SAFETY LOCK, Fig. 21, consists of the *thumb-piece*, A; *spindle*, B; *spring*, C; and *spring spindle*, D, assembled in manufacture. It has the *cam*, E; *cocking piece groove*, F; *spring spindle hole*, G; and *bolt collar notch*, H. The *spring* is shown in Fig. 22, and the *spring spindle* in Fig. 23; the latter, projecting into its groove in the sleeve, under the action of the spring, holds the safety lock in its seat and turned either to the right or left.

Fig. 21.

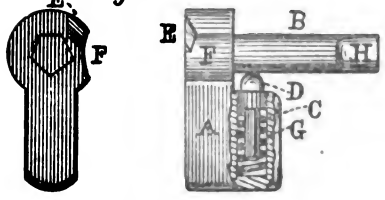
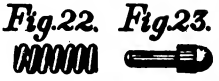


Fig. 22. Fig. 23.



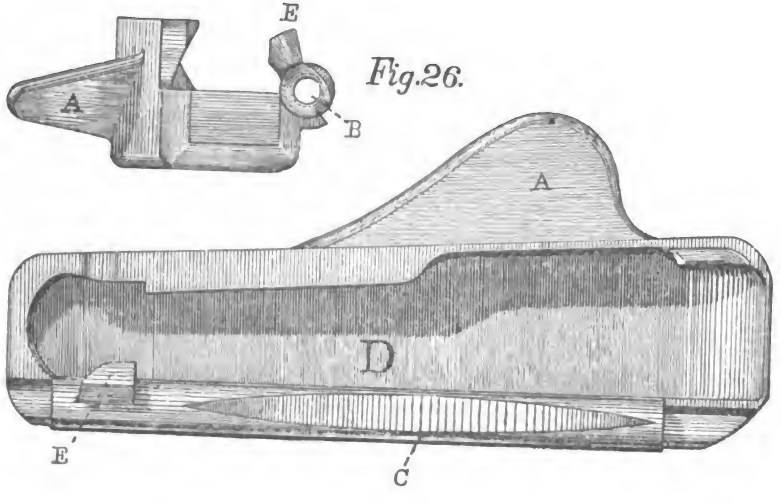
The SIDE PLATE, Fig. 24, has the *rib*, A; the *tenon*, B; the *ejector pin hole recess*, C; the *side plate screw hole*, D; and the *ramp*, E. The side plate forms the left wall of the magazine and is held in its seat in the receiver by the tenon and the SIDE PLATE SCREW, Fig. 25.

Fig. 24.

Fig. 25.

The parts of the GATE, Fig. 26, are the *thumb-piece*, A; *hinge hole*, B; *bearing* for magazine spring, C; the *recess*, D, which receives the carrier and follower; and the *lug*, E, on which is a cam for withdrawing the carrier into the recess.

Fig. 26.



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The HINGE BAR, Fig. 27, consists of the *pin*, A, and the *head*, B, as-

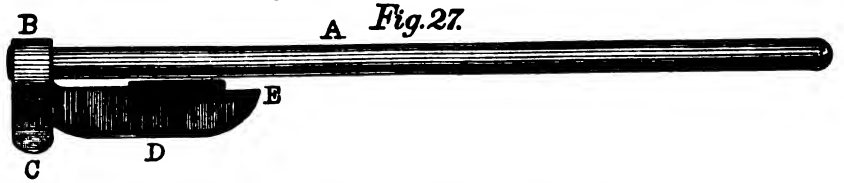

Fig. 27.

sembled in manufacture. The *pin* holds the gate in its seat in the receiver and forms the hinge on which the gate turns. The *head* retains the pin in place and prevents its rotation with the gate. The *lug*, C, forms a handle for turning the *point*, E, of the *spring*, D, out of its seat in the receiver and for withdrawing the hinge bar in dismounting the magazine mechanism. The *spring*, D, protects the bottom end of the carrier arbor.

The MAGAZINE SPRING, Fig. 28, has a *lip*, A, on its front end, which bears in the notch on the heel of the carrier.

Fig. 28.

The CARRIER, Fig. 29, has the *curved face*, A; the *arbor*, B; the *heel*, C; the *cam*, D; the *follower pin hole*, E; and the *point*, F, which is shaped to raise the cartridges into the magazine channel.

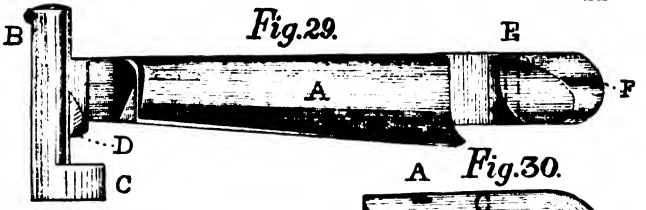

Fig. 29.

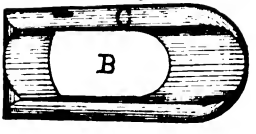

Fig. 30.

Fig. 31.

The FOLLOWER, Fig. 30, has the *pin holes*, A; the opening, B, through which the point of the carrier operates; and the *top*, C: it is assembled to the carrier by the FOLLOWER PIN, Fig. 31, on which it swings. This pin is tapering, its small end is inserted from the top of the follower and, when driven into place, both ends are upset and the upper filed until all projection above the top of the follower is removed.

The CUT-OFF, Fig. 32, includes the *spring* and *spring spindle* assembled. The parts are, *thumb-piece*, A; *spindle*, B; *point*, C; and *spring spindle hole*, D.

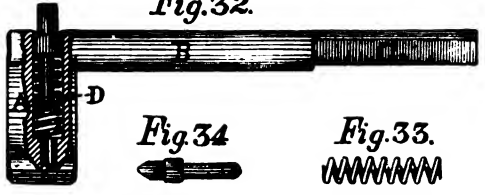

Fig. 32.

Fig. 34.

Fig. 33.

The CUT-OFF SPRING, Fig. 33, and its SPINDLE, Fig. 34, retain the cut-off in its seat in the receiver and hold the thumb-piece turned either up or down.

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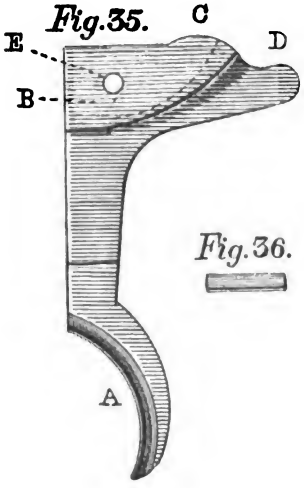
Fig. 35.



The TRIGGER, Fig. 35, has the *finger-piece*, A; *scar recess*, B; *bearings*, C; *heel*, D; and *trigger pin holes*, E.

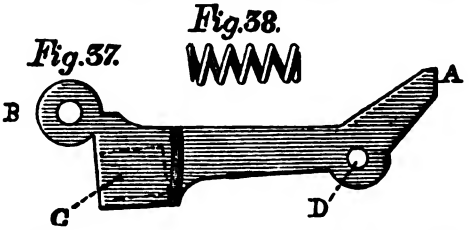
The scar is hinged in its seat in the trigger by the TRIGGER PIN, Fig. 36, which is tapering, and in assembling its small end must be driven into the trigger holes from the right and upset on the left.

Fig. 36.

The SEAR, Fig. 37, has the *nose*, A; *hinge*, B; *spring hole*, C; and *trigger pin hole*, D. The hole in the hinge, made for convenience in manufacture, performs no part in the working of the sear.

Fig. 38.

Fig. 37.



The SEAR SPRING, Fig. 38, occupies the hole, C, in the sear and its front end bears against the receiver.

Fig. 39

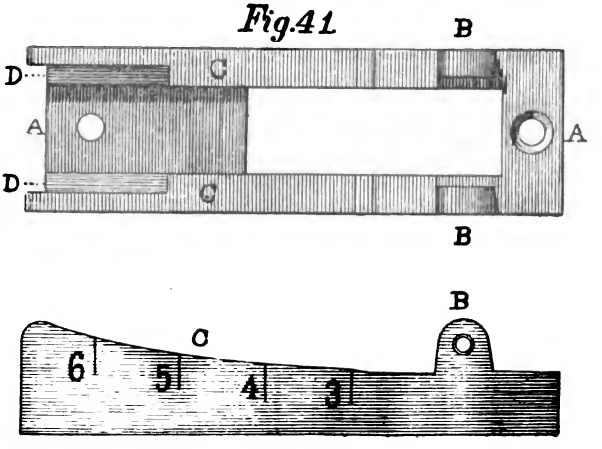
Fig. 40.

The FRONT SIGHT, Fig. 39, is secured in its slot in the stud by the FRONT SIGHT PIN, Fig. 40. This pin is tapering and its small end is driven in from the right and upset on the left.

The REAR SIGHT BASE is represented in Fig. 41. The parts are the *screw holes*, A; the *ears*, B, which contain the *joint screw holes*, that in the right ear being threaded; the *sides*, C, the upper surfaces of which are curved to give any elevation from 275 to 650 yards inclusive; and the *rails*, D, upon which the leaf rests when the sight is adjusted for ranges less than 275 yards.

The space between the rails forms the seat for the base spring and the undercuts beneath them receive its bevels. The elevations for 300, 400, 500, and 600 yards are marked on the left side; the elevations for every 25 yards, from 275 to 650, inclusive, are marked

Fig. 41



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on the right side. The bottom of the base is conical, to conform to the shape of the barrel (see Fig. 98).

The REAR SIGHT BASE SPRING, Fig. 42, has the *free end*, A; the *bevels*,

Fig. 44.

Fig. 42.

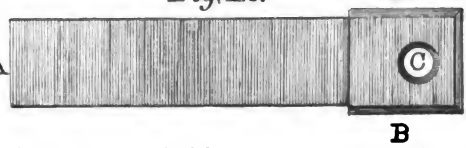
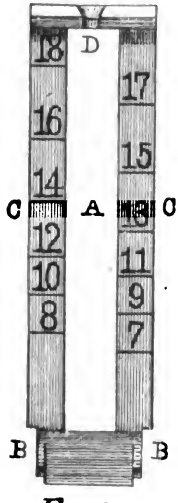


Fig. 43.

B; and the *screw hole*, C; it is held in its seat by the front base screw and its bevels. The REAR SIGHT BASE SCREWS, *front* and *rear*, are shown in Figs. 43 and 44, respectively.

Fig. 45.



The parts of the REAR SIGHT LEAF, Fig. 45, are the *slide slot*, A; *joint screw hole*, B; the *arms*, C; and the *sighting notch*, D. The rear or bottom end is so shaped that the base spring will retain it in position when adjusted for elevation. The leaf is graduated alternately on the two arms from 700 to 1,800 yards, inclusive, and is held in its seat between the ears of the base by the REAR SIGHT JOINT SCREW, Fig. 46, on which it turns.

The REAR SIGHT SLIDE, Fig. 47, has the *cap screw hole*, A, and *slide screw hole*, B, both threaded; *slide pin hole*, C; *sighting notch clearance*, D; *leaf slots*, E; *spring slot*, F; *cap tenon slot*, G; and the *undercuts*, H.

Fig. 46.

The parts of the REAR SIGHT SLIDE CAP, Fig. 48, are *cap screw hole*, A; *tenon*, B; *bevels*, C; and the *sighting notch*, E. The cap is secured to the slide, at the right end, by its bevels engaging the undercuts on the slide and, at the left end, by the REAR SIGHT SLIDE CAP SCREW, Fig. 49.

The REAR SIGHT SLIDE SPRING, Fig. 50, occupies the slot, F, in the slide and its ends bear against the arms of the leaf; it assists in adjusting the slide for elevation.

The REAR SIGHT SLIDE SCREW, Fig. 51, has the *head*, A; the *pin groove*, B; and the *knurling*, C, which enables the screw to be turned firmly against the leaf.

The REAR SIGHT SLIDE PIN, Fig. 52, is inserted in the *pin hole*, C, of the slide and, projecting into the groove, B, of the slide screw, prevents the removal of the latter.

Fig. 47.

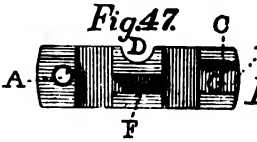


Fig. 50.

Fig. 52.

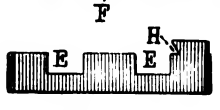


Fig. 51.

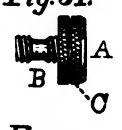


Fig. 48.

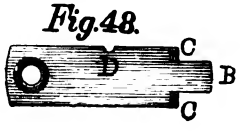


Fig. 49.

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The STOCK is represented in Fig. 53, top view; and Fig. 54, right side, showing section of butt. The parts are, A, butt; B, small; C, receiver bed; D, barrel bed; E, small butt plate screw hole and seat for butt plate tang; F, butt swivel plate seat; G, mortise for receiver tang lug and hole for rear guard screw; H, mortise for sear and slot for trigger; I, cut for handle seat on receiver; J, hole for front guard screw; K, cut for hinge bar head; L, recesses for hand guard springs; M, finger grooves; N, shoulders for bands; O, hole for lower band pin; P, hole for upper band screw; and Q, channels to decrease the weight. The two large holes, R and S, in the butt diminish the weight; three small holes, T, which extend from the large hole, R, receive the sections of the cleaning rod. Part of the wall, U, between the large holes is cut away for the oiler. The initials of the Inspector and the year of fabrication are stamped on the left side, in rear of the side plate.

Fig. 53.

Fig. 54.

The HAND GUARD consists of the *body*, *springs*, and *rivets*, assembled.

The HAND GUARD BODY, Fig. 55, extends over the barrel from the front end of the well of the receiver to the lower band, and forms a protection from the heat developed in firing. The parts are, A, *mortise* for rear sight; B, *grooves* for the hand guard springs; C, *holes* for the hand guard rivets, countersunk on the top side to protect the hand from the rivets when heated by firing; and D, *mortise* for tenon of receiver.

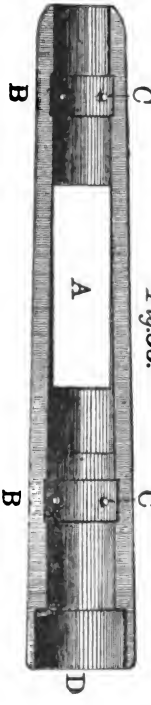

Fig. 55.

The front HAND GUARD SPRING is shown in Fig. 56; the rear spring is similar to but larger than the front. Each spring is fastened to the body by two rivets, and the hand guard is held in place by the springs embracing the barrel.

Fig. 56.

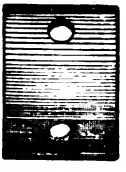

Fig. 57.

One of the front HAND GUARD RIVETS is shown in Fig. 57. The rear rivets differ from the front only in their length.

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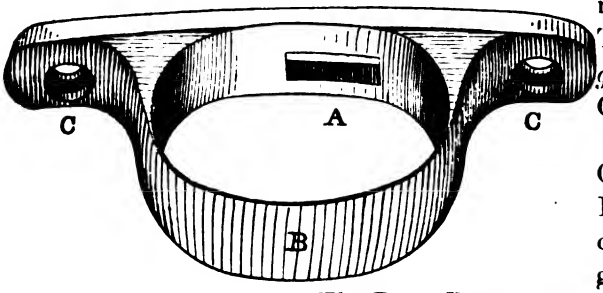
Fig. 58.



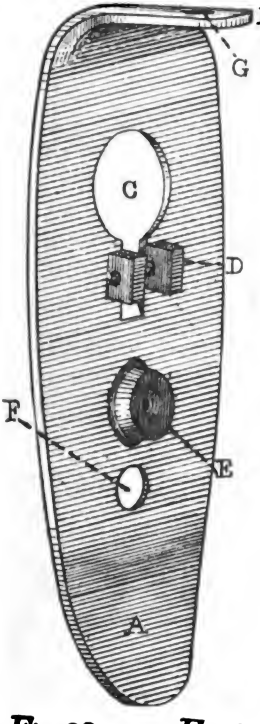
The GUARD is represented in Fig. 58. The parts are A, *trigger slot;* B, *bow;* and C, *guard screw holes.*

The front and rear GUARD SCREWS, Figs. 59 and 60, secure the receiver and guard to the stock.

Fig. 59.

Fig. 60.

Fig. 61.



The BUTT PLATE is represented in Fig. 61. The parts are, A, *toe;* B, *tang;* C, *cap hole;* D, *cap ears,* through which are the *cap pin holes;* E, *spring lug;* F, large *butt plate screw hole,* and G, small *butt plate screw hole.* A notch is cut into the edge of the cap hole to facilitate the opening of the cap.

The large and small BUTT PLATE SCREWS, Figs. 62 and 63, secure the butt plate to the stock.

The BUTT PLATE CAP, Fig. 64, has the *cap pin hole,* A, and the *thumb notch,* B. The cap is hinged between the ears of the butt plate on the cap pin and is retained either closed or opened by the free end of the CAP SPRING, Fig. 65, which bears on the *heel,* C.

The BUTT PLATE CAP PIN, Fig. 66, after being driven into the holes in the ears of the butt plate and cap, has its ends slightly upset.

Fig. 62.

Fig. 63.

Fig. 65.

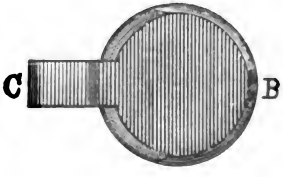


Fig. 67.

Fig. 66.

Fig. 64.

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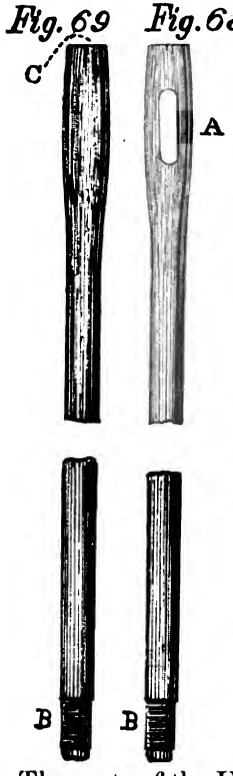
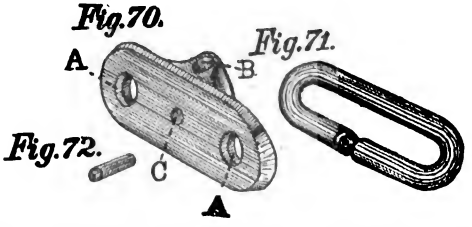
The BUTT PLATE CAP SPRING SCREW, Fig. 67, secures the cap spring to the lug on the butt plate and is firmly screwed against the spring.



The CLEANING ROD consists of three sections. The FIRST SECTION, Fig. 68, has the *slot*, A, for a cleaning rag; and the *tenon*, B, which is threaded to fit the hole in another section; the SECOND and THIRD SECTIONS, Fig. 69, are identical; the parts are *hole*, C, tapped to receive the tenon of another section; and the *tenon*, B.

The BUTT SWIVEL includes the *plate*, *swivel* and *pin* assembled.

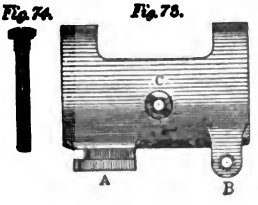


The BUTT SWIVEL PLATE, Fig. 70, has the *holes*, A, for the swivel plate screws; B, for the *swivel*; and C, for the *swivel pin*.

The SWIVEL, Fig. 71, is retained in the plate by the BUTT SWIVEL PIN, Fig. 72.

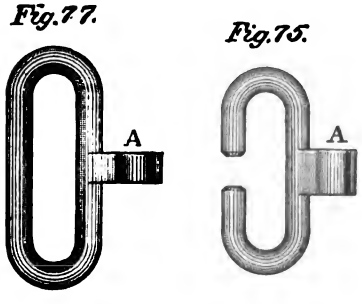
The BUTT SWIVEL SCREWS are the same as the small butt plate screw (see Fig. 63).

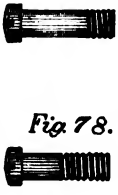
The parts of the UPPER BAND, Fig. 73, are the *bayonet stud*, A; the *stacking swivel ears*, B, which contain the *stacking swivel screw holes*; and the *band screw holes*, C.



The UPPER BAND SCREW, Fig. 74, secures the band to the stock, the thread under the head engaging in the hole on the right side of the band.

The STACKING SWIVEL, Fig. 75, is hinged by the *lug*, A, between the ears, B, of the upper band, on the STACKING SWIVEL SCREW, Fig. 76, which, after assembling, has its threaded end upset.





The *lug*, A, of the LOWER BAND SWIVEL, Fig. 77, is inserted between the ears, A, of the lower band and the swivel is held in place by the SWIVEL SCREW, Fig. 78, the left or threaded end of which is upset when in place.

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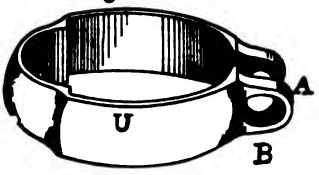
The LOWER BAND, Fig. 79, has the *swivel ears*, A; and *swivel screw holes*, B; it is slotted between the ears so that when the swivel screw is fully inserted, the barrel and stock are brought into close contact. The front or upper end of the band is indicated by the letter U.

Fig.79.



The ends of the LOWER BAND PIN, Fig. 80, project slightly beyond the stock to prevent the band slipping forward.

Fig.80.

The BAYONET consists of the *blade, guard, pommel, catch, catch nut, catch spring, grip*

Fig.81.

bodies, rivets and *washers*, assembled; it is shown on the rifle in Figs. 1 and 2, and is of the knife pattern.

Fig.82

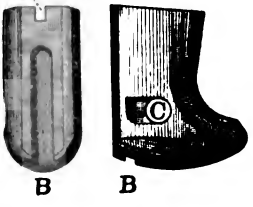
The BLADE is represented in Fig. 81. The parts are *body*, A; *point*, B; *tang*, C; *shoulder*, D, for the guard; and *rivet holes*, E.

The GUARD, Fig. 82, has the *barrel hole*, A; the *mortise*, B, and *flanges*, C, for the blade tang.

The parts of the POMMEL, Fig. 83, are the *slot*, A, into which the blade tang is brazed in manufacture; the *undercut groove*, B, which receives the stud on the upper band when the bayonet is fixed; and the *hole*, C, for the catch and its spring.

The parts of the CATCH, Fig. 84, are the *thread*, A, for the nut; the *lug*, B; and the *cam*, C.

Fig.83.



The CATCH SPRING, Fig. 85, surrounds the spindle of the catch, one end bears on a shoulder in the hole, C, of the pommel and the other against the catch nut.

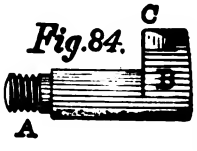
The CATCH NUT, Fig. 86, retains the catch in the pommel and serves as a thumb-piece for its manipulation.

The edge of the catch lug, under the action of the spring, projects into the undercut groove of the pommel. As the bayonet is fixed, the upper end of the bayonet stud on the upper band, in entering this groove, comes into contact with the cam, C, and forces the lug out of the groove until the stud has

Fig.86.

Fig.85.

Fig.84.



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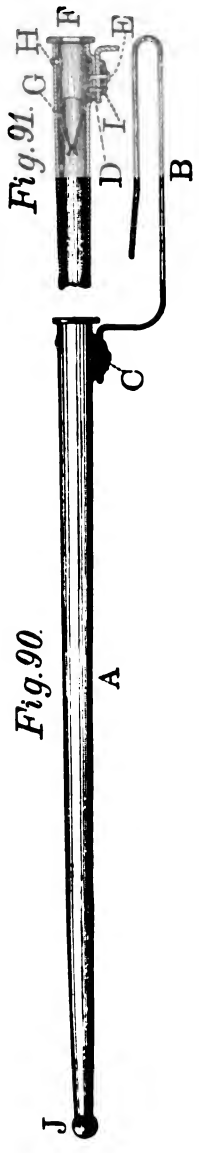

Fig. 91.

Fig. 90.

passed, when the catch spring returns the lug into the groove below the bayonet stud, thereby securing the bayonet to the rifle. Pressure upon the catch nut withdraws the lug from the groove and allows the bayonet to be removed.

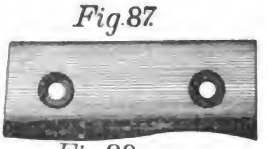
Fig. 87

Fig. 88.

Fig. 89

The right BAYONET GRIP BODY is shown in Fig. 87; the left is the reverse of the right. They cover the tang between the guard and pommel and are secured to it by two RIVETS, Fig. 88, with WASHERS, Fig. 89, at either end.

The BAYONET SCABBARD is shown in Fig. 90 and a cross section of its upper end in Fig. 91. The parts are *body*, A; *hook*, B; which is attached to the former by the interior and exterior *washers*, C and D, and the *rivet*, E; *mouthpiece*, F, and *spring*, G, which are brazed together in manufacture, and secured to the body by the *rivet*, H; the *pin*, I, which limits the oscillation of the hook to 50 degrees on each side of the vertical; and the *knob*, J, which protects the small end of the body and through which is a hole to permit the escape of water entering the body. The spring, G, retains the bayonet in the scabbard.

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Fig.92.

Fig.93.

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CARBINE, MODEL 1896.

Component Parts, 75 in Number.

(The parts in italics are peculiar to the Carbine; all others are the same as in the Rifle.)

Band.
Band Spring.
Barrel:
Barrel.
Front Sight Stud.
Bolt.
Butt Plate.
Butt Plate Cap.
Butt Plate Cap Pin.
Butt Plate Cap Spring.
Butt Plate Cap Spring Screw.
Butt Plate Screw, large.
Butt Plate Screw, small.
Carrier.
Cleaning Rod, 1st section.
Cleaning Rod, 2d section.
Cut-Off.
Cut-Off Spring.
Cut-Off Spring Spindle.
Ejector.
Ejector Pin.
Extractor.
Extractor Pin.
Extractor Rivet.
Extractor Spring.
Firing Pin:
Cocking Piece.
Firing Pin Rod.
Follower.
Follower Pin.
Front Sight.
Front Sight Pin.
Gate.
Guard.
Guard Screw, front.
Guard Screw, rear.
Hand Guard:
Hand Guard Body.
Hand Guard Rivets (2).
Hand Guard Spring.
Hinge Bar:
Hinge Bar Head.
Hinge Bar Pin.
Magazine Spring.
Main Spring.
Rear Sight Base.
Rear Sight Base Screw, front.
Rear Sight Base Screw, rear.
Rear Sight Base Spring.
Rear Sight Joint Screw.
Rear Sight Leaf.
Rear Sight Slide.
Rear Sight Slide Cap.
Rear Sight Slide Cap Screw.
Rear Sight Slide Pin.
Rear Sight Slide Screw.
Rear Sight Slide Spring.
Receiver:
Receiver.
Guide Lip.
Guide Lip Rivet.

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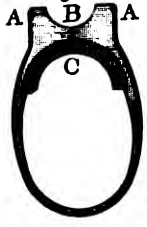
Safety Lock:
- Safety Lock Spindle.
- Safety Lock Spring.
- Safety Lock Spring Spindle.
- Safety Lock Thumb-piece.

Sear.
Sear Spring.
Side Plate.
Side Plate Screw.
Sleeve.
Stock.
Striker.
Carbine Swivel.
Swivel Bar.
Swivel Plate.
Swivel Ring.
Swivel Screw, front.
Swivel Screw, rear.
Trigger.
Trigger Pin.

DESCRIPTION
AND NOMENCLATURE OF CARBINE.

The Carbine is shown in Fig. 92, top view, and in Fig. 93, right side view.

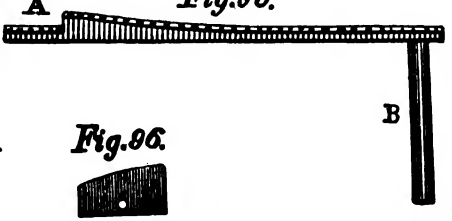
Fig.94



The BAND, Fig. 94, has the *sight protector*, A; *clearance* for sighting, B; and *hand guard recess*, C.

The BAND SPRING, Fig. 95, has the *notch*, A, which holds the band in place; and the *spindle*, B, to retain the spring in the stock.

Fig.95.



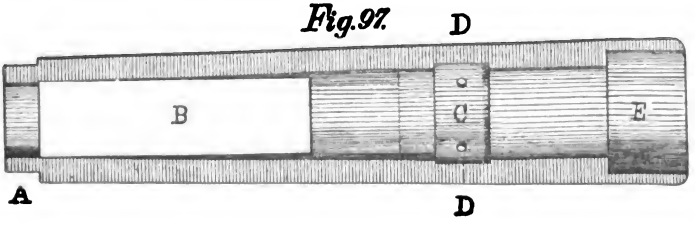
The BARREL is the same as the rear 22 inches of the rifle barrel.

Fig.96.

The FRONT SIGHT, Fig. 96, has the letter "C" stamped on its left side to distinguish it from that for the rifle.

The HAND GUARD consists of the *body*, *spring*, and *rivets*. The BODY, Fig. 97, has the *tenon*, A, by which its front end is held in place by the band; the *mortise*, B, for the rear sight; the *groove*, C, for the spring; the *rivet holes*, D; and the *mortise*, E, for covering the tenon of the receiver. The spring and rivets are the same as the rear spring and rivets in the rifle hand guard.

Fig.97.



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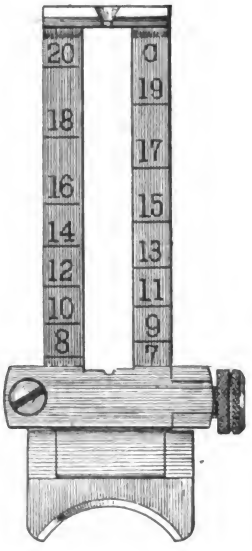
The REAR SIGHT, complete, is shown in Fig. 98, rear view. The REAR SIGHT BASE is the same as that for the rifle except that the top surfaces of the sides are curved to give the correct elevations for the carbine, and the letter "C" is stamped in rear of the graduation marks on the right side.

Fig. 98



The REAR SIGHT LEAF is the same as that for the rifle except in being graduated from 700 to 2,000 yards, inclusive, and having the letter "C" stamped above "19" on the right arm.

The top edges of the REAR SIGHT SLIDE and SLIDE CAP are slightly cut away between the arms of the leaf to lower the sighting notch.

Fig. 99.

The REAR SIGHT BASE SCREW, front, Fig. 99, has a thinner head than in the rifle.

The parts of the STOCK, shown in Fig. 100, top view, and in Fig. 101, side view with section of butt, are the same as in the corresponding portions of the rifle stock, except as follows: The shape of the front end or *nose*, V; the omission of the butt swivel plate seat, the butt swivel plate screw holes, and the lower band pin hole; the addition of the *band spring seat* and *hole*, W; the *swivel plate seat*, and the *swivel plate screw holes*.

Fig. 100.

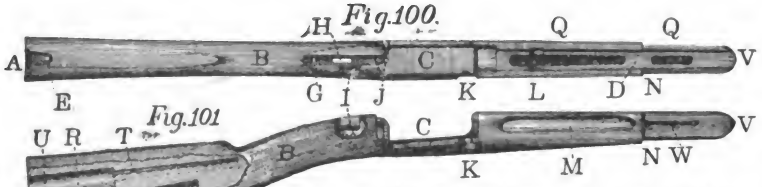


Fig. 101

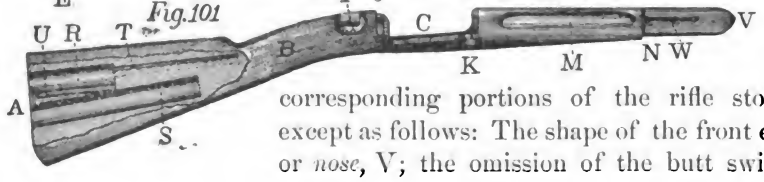


Fig. 102.

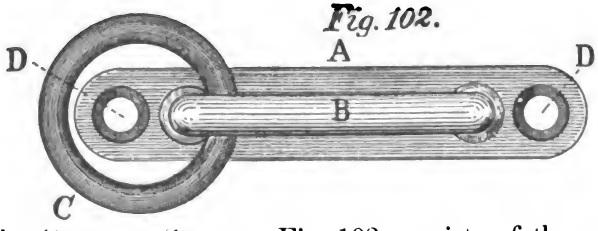


Fig. 103.

The CARBINE SWIVEL, Fig. 102, consists of the *plate*, A, to which the *bar*, B, is riveted in manufacture; and the *ring*, C. The *holes*, D, are for the swivel screws which secure the swivel to the stock.

The rear SWIVEL SCREW is the same as the small butt plate screw, and the front, Fig. 103, differs from the rear only in being shorter.

The CLEANING ROD consists of the *first* and *second sections* of that for the rifle.

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CADET RIFLE.

86 Components.

The Cadet Rifle is the same as the Model 1896 Rifle, except as follows:—

The STOCK has a groove for the ramrod, seat for lower band spring, and seat for ramrod stop; the seat for the butt swivel plate, the holes for the butt swivel plate screws, the small holes for the sections of the cleaning rod, and the seat for the oiler in the butt, and the channels in front of the lower band for decreasing the weight, are omitted.

The UPPER BAND has a lug through which the ramrod passes.

The LOWER BAND is solid, has no swivel or screw, and is retained in place by the BAND SPRING, which is identical with that of the carbine; the lower band pin is omitted.

The BUTT PLATE has no cap.

The head of the RAMROD is enlarged and slotted for a cleaning rag, the other end is threaded, and is screwed into the RAMROD STOP to hold it in place.

The BUTT SWIVEL is omitted.

The blade of the BAYONET is three inches shorter than that for the service rifle.

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RIFLE AND CARBINE, MODEL 1898.

DESCRIPTION.

The nomenclature and number of components are the same as for the Model 1896 rifle and carbine.

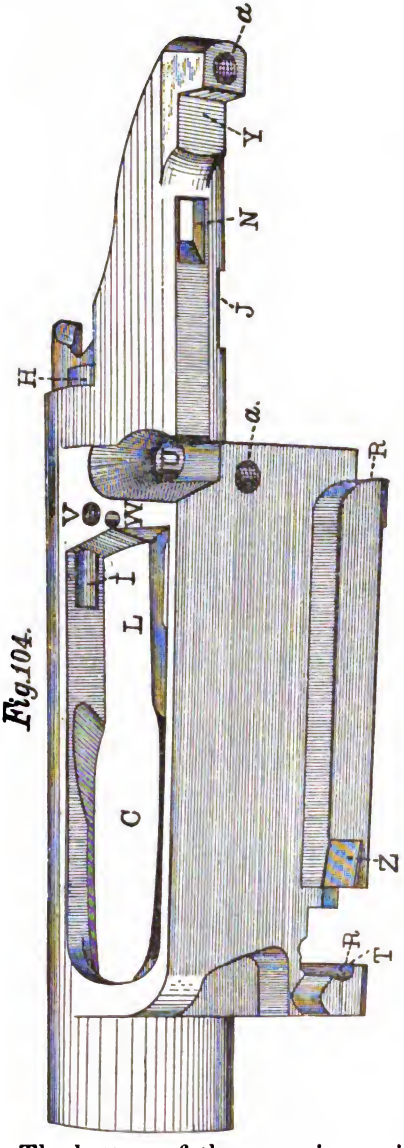

Fig. 104.

The following component parts only are different from those in the Model 1896, viz:—Receiver, Bolt, Carrier, Cut-Off, Gate, Side Plate, Stock, and Rear Sight Base Screw, front.

RECEIVER.

The RECEIVER, Fig. 104, differs from the Model 1896 as follows:—

The *cut-off hole*, I, is one-half inch shorter, and its position with reference to the well hole is slightly changed. The rear end of the cut-off hole is enlarged to admit the fillet of metal added at the junction of the thumb-piece and spindle of the cut-off.

That part of the *bolt handle seat*, J, projecting beyond the exterior wall, is omitted.

The width of the *side plate tenon mortise* is increased.

The outside of the right wall above the gate is beveled (see A, Fig. 117) to increase the space between it and the thumb-piece of the gate.

The bearing for the top side of the carrier, in the carrier arbor cavity, is lower, to enable the pivot of the carrier to be made perpendicular to its top side.

That part of the left wall of the magazine spring channel, projecting in front of the bottom wall, is omitted.

The bottom of the magazine spring channel is parallel to the bottom of the magazine. That part of the mark on the right side of the tenon for locating the barrel is omitted.

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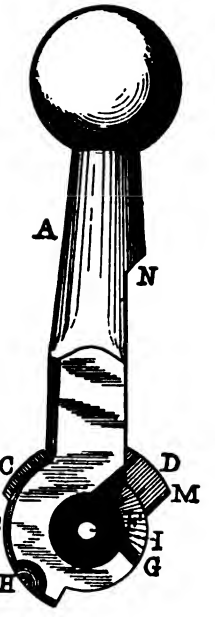
BOLT.

The length of the flat surface, N, Fig. 105, on the underside of the handle is increased in order that the handle, when turned down, will not strike the stock. The Model 1898 bolt can be used in a Model 1896 gun, but the Model 1896 bolt cannot be used in a Model 1898 gun.

Fig. 105.



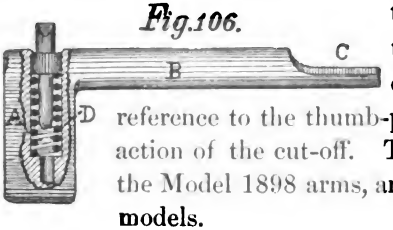
CARRIER.

The total length of the pivot is decreased, and the arbor is made perpendicular to the top side. The Model 1898 carrier is peculiar to the Model 1898 arms, and is not interchangeable with previous models.

CUT-OFF.

The *point*, C, of the cut-off, Fig. 106, is one-half inch shorter, a fillet is added at the junction of the spindle and thumb-piece for additional strength, and the flattening of the *point* is on the opposite side with reference to the thumb-piece. This latter change reverses the action of the cut-off. The Model 1898 cut-off is peculiar to the Model 1898 arms, and is not interchangeable with previous models.

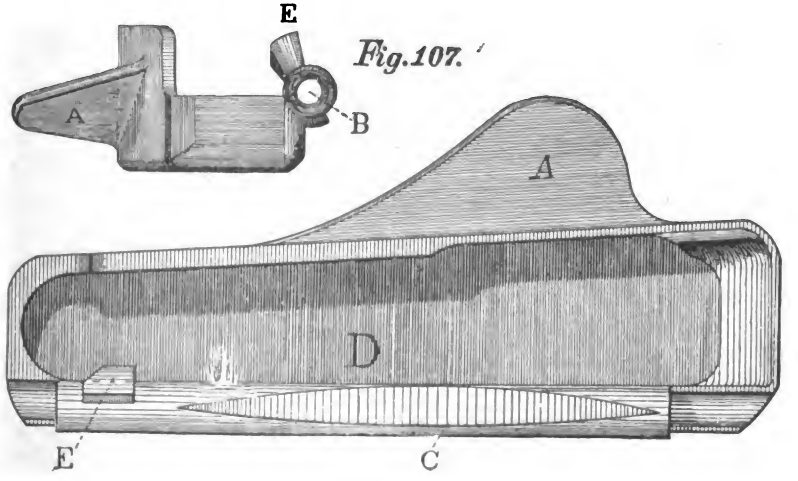
Fig. 106.



GATE.

The curvature of the rear end of the gate, Fig. 107, is decreased to give more room in the magazine for the cartridge heads, and the front part of the interior wall of the top is made straight by omitting the beveled flange. The different models of the gate are all interchangeable.

Fig. 107.



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SIDE PLATE.

The thickness of the *tenon* of the side plate is increased to give additional strength. The Model 1898 side plate must be used in Model 1898 arms, and is not interchangeable with previous models.

STOCK.

Fig. 108.

The *bed*, I, for the bolt handle, Fig. 108, is changed to conform to the omission of the projecting part of the handle seat from the receiver. The Model 1898 stock is peculiar to the Model 1898 arms, and is not interchangeable with previous models.

REAR SIGHT BASE SCREW, FRONT.

This screw, in the Model 1898 rifle, is the same as that for the carbine (see Fig. 99).

APPENDAGES.

The BARRACK CLEANING ROD, Fig. 109, has the *ring handle*, A, and the *knob*, B; it is made of brass wire: that for the carbine is 8 inches shorter than the one for the rifle, the length of each being such that the ejector will not be struck in cleaning the bore from the muzzle.

The OILER, Fig. 110, consists of the *can*, A; *top*, B; *washer*, C; and *wire*, D. The washer is to prevent leaking of the oil. The wire, the point of which is flattened, is to apply oil, a drop or more at a time. The oiler is carried either in the butt of the stock or in a loop of the cartridge belt. The oil is only for lubrication of the working parts.

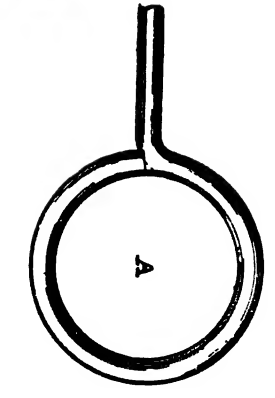
Fig. 110.

Fig. 109.

The SCREW DRIVER, Fig. 111, has the *large blade*, A; the *small blade*, B; and the *pin*, C.

Fig. 111.

The large blade should be used for the large butt plate screw, and for the screws in the upper band, guard, and butt plate cap spring; the small blade for all other screws, except the rear sight joint screw, which requires a narrower blade. The pin serves as a drift in removing the butt plate cap, trigger, and lower band pins.



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The Assembled Parts and their Operations.

Most of the operating parts may be included under the BOLT MECHANISM and the MAGAZINE MECHANISM.

The BOLT MECHANISM consists of the bolt, sleeve, extractor, extractor rivet, safety lock, firing pin, striker, and main spring.

The bolt moves backward and forward and rotates in the wellhole of the receiver; it carries a cartridge, either from the magazine or one placed by hand in front of it, into the chamber and supports its head when fired. The locking lug will sustain any powder pressure liable to occur, but if worn by usage or upset by excessive pressures the rear end of the guide rib will bear on the locking shoulder of the receiver, permitting the continued use of the arm with safety.

The sleeve unites the parts of the bolt mechanism; its rotation with the bolt is prevented by its arm occupying the opening between the walls of the receiver.

The hook of the extractor engages the rim of the cartridge case and retains the head of the latter in the countersink of the bolt until the case is ejected. The extractor spring, engaging its lip on the receiver, prevents the hook from releasing the rim of the cartridge case, when the latter is being started from the chamber. The extractor pin holds the bolt open for convenience in loading when using single-loader fire.

The safety lock, when turned to the left, is inoperative; when turned to the right, the point of its spindle enters the notch in the bolt collar and locks the bolt. If turned to the right when the piece is cocked, its cam forces the firing pin slightly to the rear, out of contact with the sear, so that, if the trigger be pulled, the sear, when the trigger is released, can rise to catch the firing pin, when the safety lock is turned to the left, thereby preventing accidental discharge. If turned to the right, when the piece is not cocked, it locks the firing pin as well as the bolt.

The gun having been discharged, to remove the empty cartridge case, reload, and fire, the bolt mechanism operates as follows:

To open the bolt, raise the handle until it comes into contact with the sleeve, then pull it directly to the rear until the locking lug strikes the locking shoulder of the receiver.

Raising the handle rotates the bolt. This separates the locking lug from the shoulder of its recess in the receiver, with which it is brought into close contact by the powder pressure. This separation is made easy by the slight inclination to the axis of the receiver of the vertical planes containing the rear surface of the locking lug and the shoulder of its recess.

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The rotation also causes the cocking cam of the bolt to force the firing pin to the rear, withdrawing the point of the striker into the bolt. The rotation of the firing pin is prevented by the lug on the cocking piece projecting through the slot in the sleeve into its groove in the receiver. As the sleeve remains longitudinally stationary with reference to the bolt, this rearward motion of the firing pin, and consequently of the striker, will begin the compression of the main spring, since the rear end of the latter bears against the front end of the barrel of the sleeve and the front end against the rear end of the striker.

When the bolt handle strikes the sleeve, rotation ceases, during which the firing pin has been forced to the rear by the cocking cam on the bolt until the sear notch of the cocking piece has passed the point of the sear, the cocking-piece nose entered the notch in the rear end of the bolt, and the main spring partly compressed; the locking lug will then be out of its recess and the guide rib under the extractor.

When the bolt handle is raised into contact with the cam on the cocking shoulder of the receiver, a direct motion to the rear will be combined with the rotation, so that the cartridge case will be started from the chamber by the action of this cam.

The bolt is then drawn directly to the rear, the extractor and guide rib move along the left wall and through the opening between the two walls of the receiver. The parts are retained in position by the cocking-piece nose remaining in the notch in the rear end of the bolt, and the main spring is partly compressed.

The relative position of the parts of the bolt mechanism is then shown in Fig. 112.

To close the bolt, push the handle forward until it strikes the cocking shoulder, then turn it down until it

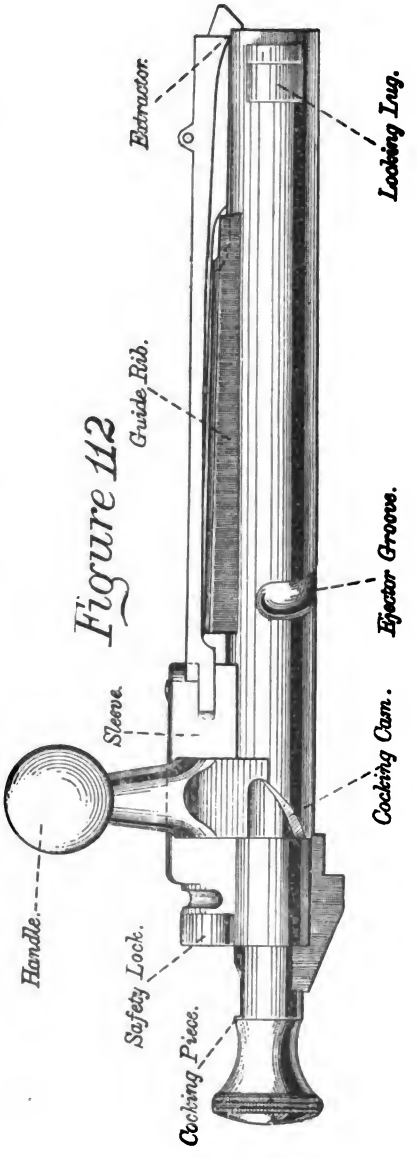

Figure 112

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comes into contact with its seat in the receiver. As the handle is turned down, the rear end of the guide rib, traveling along the cam of the locking shoulder of the receiver, will move the bolt forward until the locking lug comes into contact with the cam of its recess in the receiver, which moves the bolt slightly forward into its closed position. As all movement of the firing pin is prevented by the point of the sear engaging the sear notch of the cocking piece, the forward movement of the bolt, produced by these cams, completes the compression of the main spring, the seating of the cartridge in the chamber, and forces the extractor hook over the rim of the cartridge case.

In closing the bolt, a cartridge from the magazine, if using magazine fire, or one placed by hand in the well of the receiver in front of the bolt, will be carried forward into the chamber. The gun is then ready to be fired.

The position then occupied by the parts is shown in Fig. 113.

When the bolt is rotated so the guide rib is under the extractor, the front end of the guide rib engages a lug on the underside of the extractor and holds the latter against the left wall of the receiver so the hook, as the bolt is closed, will enter its notch in the receiver and barrel.

To pull the trigger, the finger-piece must be drawn to the rear until contact with the receiver is transferred from its bearings to the heel, which gives a creep to the trigger, and then until the point of the sear is withdrawn from in front of the cocking piece.

The heel of the ejector rises into its groove in the bolt, but just before the bolt is drawn fully to the rear, the end of the groove suddenly forces the heel down, causing the point to rise in front of the bolt and strike the cartridge case. As the bolt is closed, the heel rises again into its groove, the curved portion of which permits the bolt to rotate without operating the ejector. The upper surface of the front end of the ejector is shaped so as to throw the cartridge case out of the receiver, upward and to the right.

It is to be noted that, in this system of bolt mechanism, the compression of the main spring, the seating of the cartridge in and the starting of the empty case from the chamber, are entirely done by the action of cams.

The piece may be cocked either by raising the bolt handle until it strikes the sleeve and then immediately turning it down, or by pulling the cocking piece directly to the rear.

In firing, unless the bolt handle is turned fully down against its seat in the receiver, the cam on the cocking piece will strike that in the rear end of the bolt and the energy of the main spring will be expended in closing the bolt instead of on the primer; this prevents the possibility of a cartridge being fired until the bolt is fully closed.

The opening and the closing of the bolt should each be done by one continuous motion.

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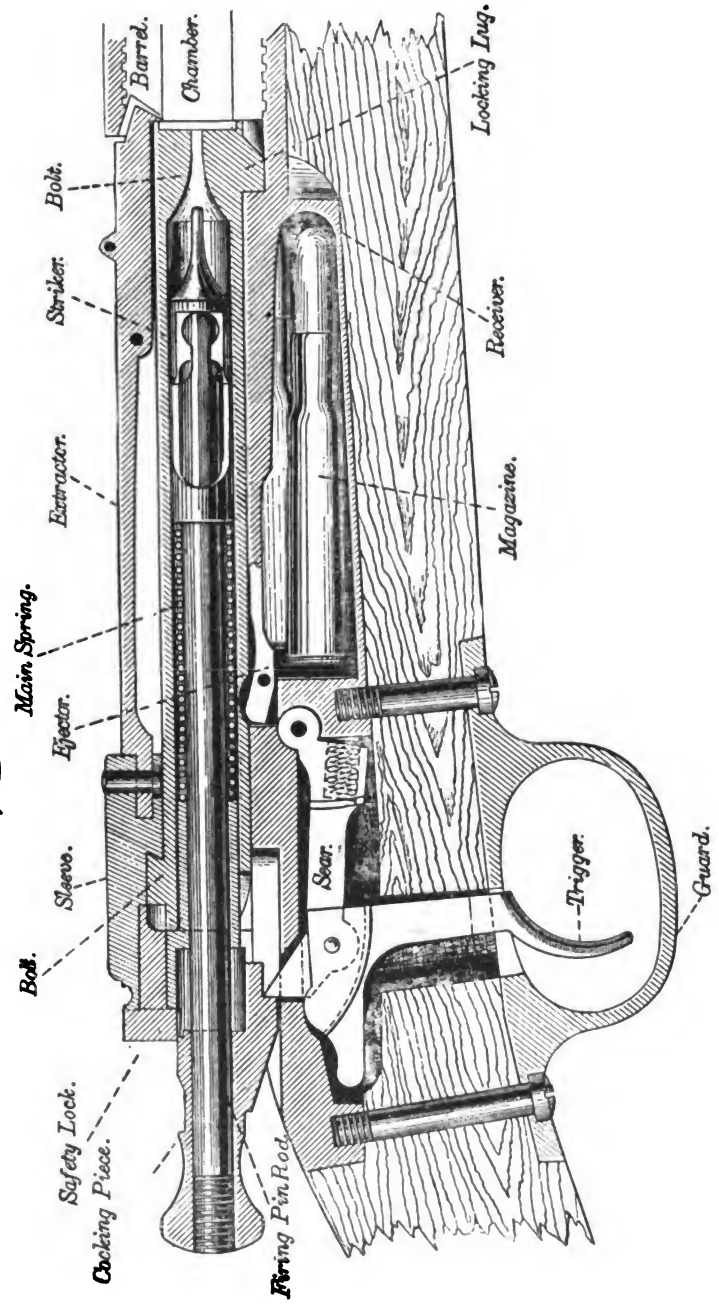

Figure 113

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The MAGAZINE MECHANISM includes the gate, carrier, follower, magazine spring, hinge bar and cut-off.

Fig. 114 represents a cross section of the gun, through the point of the ejector; the bolt is closed, the magazine contains five cartridges and is "off."

Fig. 114.

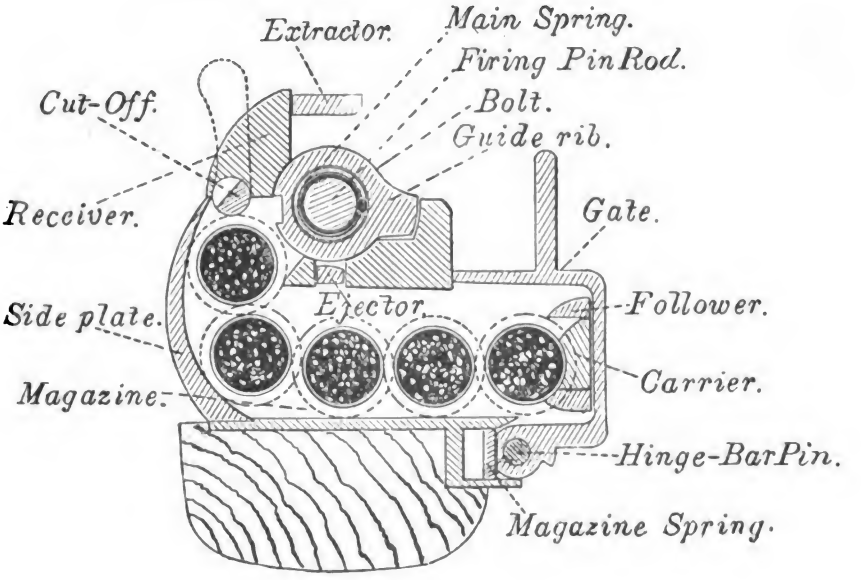
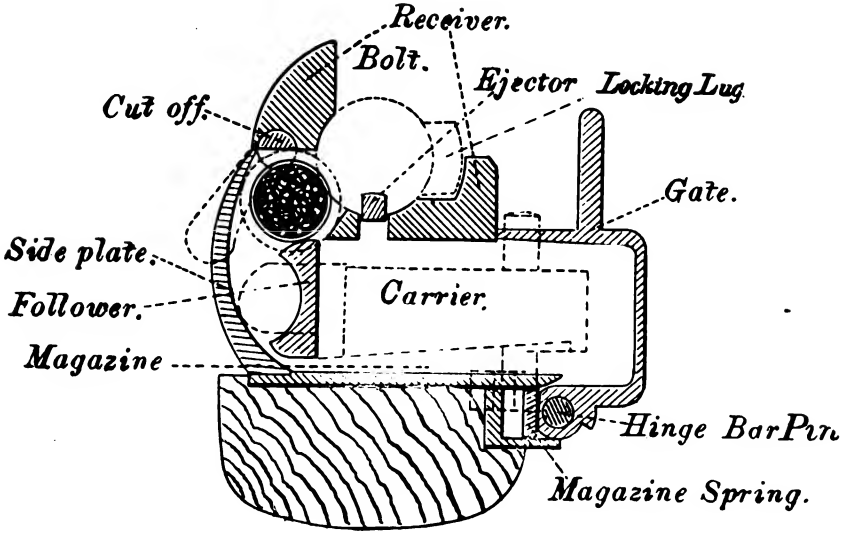


Fig. 115 shows the same cross section when all but the last cartridge has been fired; the magazine is "on" and the bolt opened.

Fig. 115.



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To charge the magazine, open the gate, insert the cartridges from a clip, or from the hand, then close the gate.

As the gate is opened, its lug, acting on the cam of the carrier, Fig. 116, retracts the latter within the recess of the gate, leaving an unobstructed opening for the insertion of the cartridges. As the gate is closed, the magazine spring, the front end of which bears on the lug of the arbor of the carrier, Fig. 116, swings the carrier into the magazine, against the last cartridge inserted. The point of the carrier forces the cartridges, in succession, against and up the curved surface of the side plate, into the magazine channel. When there is only one cartridge in the magazine, the point of the carrier forces it up on the top of the follower, which holds it high enough in the channel to be caught by the bolt. The point of the carrier then rests against the inner surface of the side plate.

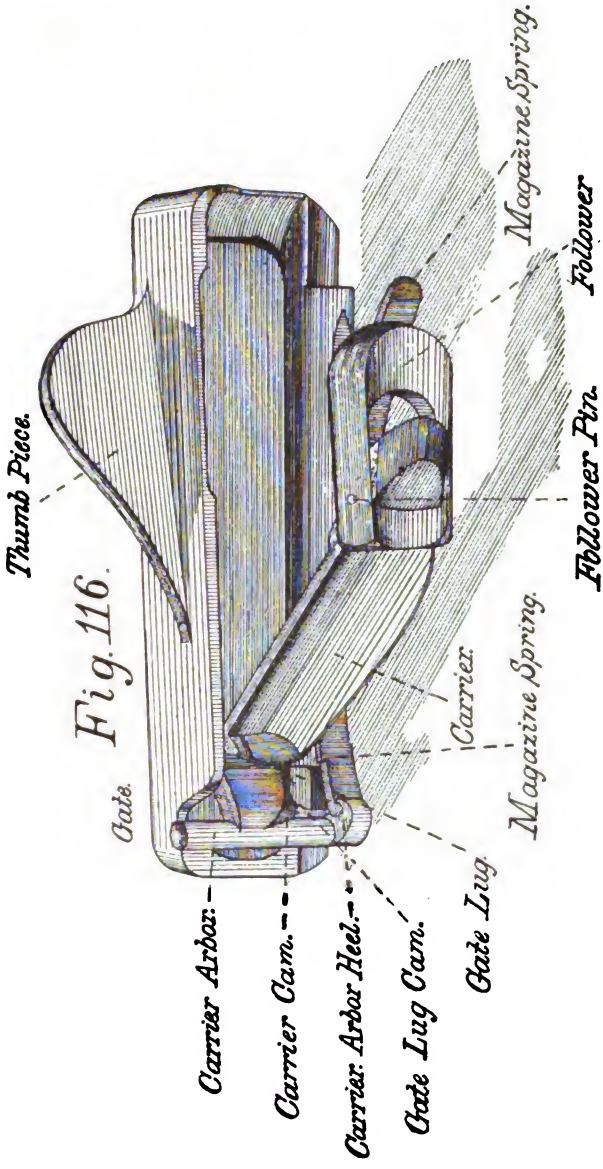

Fig. 116.

When the thumb-piece of the cut-off in the Model 1896 arms, is turned up, Fig. 114, the magazine is "off." The point of the spindle then bears on the rim of the upper cartridge and holds it down in the magazine channel below the action of the bolt. The magazine mechanism then remains inop-

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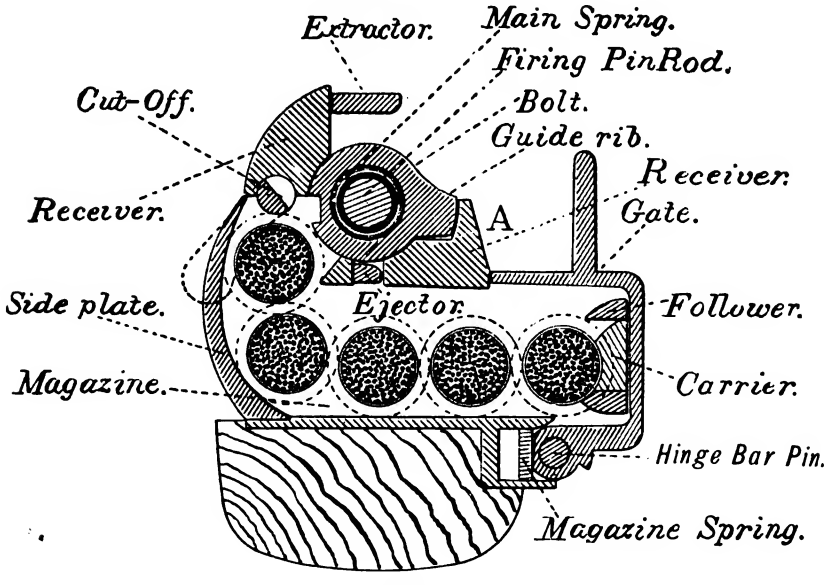
erative, and the arm can be used as a single loader, the cartridges in the magazine being held in reserve.

When the thumb-piece of the cut-off, in the Model 1896 arms, is turned down, Fig. 115, the magazine is "on." The point of the spindle then occupies its hole in the upper wall of the magazine channel, and permits the top cartridge to rise high enough to be caught by the bolt in its forward movement. As the bolt is closed, this cartridge is pushed forward, through the magazine channel and well of the receiver, into the chamber, the point of the bullet being directed by the ramps on the side plate and receiver. During this passage the cartridge is held up in the magazine channel by the pressure of those below. The last one in the magazine is held up first, by the top of the follower and, after passing the latter, by the rib of the side plate and left edge of the roof of the magazine.

In the Model 1898 arms, when the thumb-piece of the cut-off is turned down, Fig. 117, the magazine is "off," and when turned up, is "on;" or

Fig. 117.



the reverse of what it is in the Model 1896. As the arm is habitually used with the magazine "off," the thumb-piece of the cut-off is better protected when turned down.

The magazine can be charged with the bolt closed or opened, with the cut-off turned for magazine or single-loader fire, and, if one or more cartridges have been fired, can be filled.

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The magazine spring actuates the carrier, holds the gate open, assists in closing it and holds it closed.

The guide lip prevents the heads of the cartridges from falling into the well of the gate when charging the magazine.

Experimental firing and laboratory experiments show that, all other conditions being identical, the muzzle velocity of ammunition loaded with smokeless powder will be increased by exposure to a higher atmospheric temperature or decreased by a lower. Consequently, the elevation for any range will vary slightly with the atmospheric temperature. Moreover, the velocity at 53 feet stamped on the paper packages may vary, in different issues of ammunition, 15 feet on either side of the standard 1,960 foot-seconds, which corresponds to a muzzle velocity of 2,000 feet per second.

The Model 1896 rear sight allows any variation in the velocity of the ammunition from the standard, whatever its cause may be, to be compensated for, as well as any other condition that may affect the elevation for any range. Among other conditions that may require corrections in elevation are variations in light, amount of front sight seen, peculiarities of individual guns, effect of mirage on the target, effect of heat developed in firing, personal equation of the firer, et cetera.

The graduations of the rear sight are correct only for the particular conditions existing when they were experimentally determined, consequently, in adjusting the sight for elevation at any range, allowance must be made for whatever change in the elevation the difference between the former and the present conditions produces. The graduations were corrected in June, 1898, after a long series of experimental firing, and are intended to be low rather than high.

To adjust the rear sight for elevation, release the slide by turning the slide screw toward the rear, move the slide until its top surface is even with the desired graduation mark, or where the correct elevation will be obtained, then turn the slide screw toward the front until it bears *firmly* against the leaf.

Unless the slide screw firmly binds the leaf, the screw will be loosened by the recoil, and the slide moved while firing.

The sighting notch in the leaf is used for ranges less than and including 650 yards; that in the slide for all greater ranges. These notches and the front sight are in the vertical plane containing the axis of the bore, consequently the sight makes no correction for drift at any range.

To open the butt-plate cap, insert the rim of an empty cartridge case in the notch in the cap and draw it open. The joints of the cleaning rod should be removed before the oiler. In replacing the oiler and rods, insert the former so its bottom will be next the butt plate, and, with one joint of the rod, push the oiler into its seat, then insert the rods.

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PRECAUTIONS.

If it is desired to carry the piece cocked, with a cartridge in the chamber, the bolt mechanism should be secured by turning the safety lock to the right.

To obtain positive ejection, and to insure the bolt catching the top cartridge in the magazine, when using magazine fire, the bolt must be drawn fully to the rear in opening it.

If a cartridge is pushed from the magazine partly into the chamber, and then the bolt fully drawn to the rear, that cartridge will remain in the well and chamber, and a second will rise from the magazine in front of the bolt. If the bolt is again pushed forward, the second cartridge will strike the first and produce a *jam*. To avoid this, always close the bolt on a cartridge in front of it to insure the action of the extractor and ejector on that cartridge, when the bolt is opened.

If a jam occurs, draw the bolt fully to the rear and, with the right hand, remove the first cartridge and close the bolt; if the first cartridge has been pushed into the chamber, draw the bolt to the rear, with the thumb of the right hand push the second cartridge back into the magazine and cut it off; then close the bolt on the first cartridge.

To prevent the rear sight slide screw from working loose and the slide from moving while firing, after the elevation is adjusted, turn the slide screw *firmly* against the leaf.

Unless the bolt handle is fully turned down into contact with its seat in the receiver, when the trigger is pulled the nose of the cocking piece will strike against the cocking cam of the bolt, and the energy of the main spring will be expended in closing the bolt instead of in igniting the primer, causing a miss-fire. Care should be taken *not* to raise the bolt handle with the forefinger if the trigger is pulled with the middle one.

It is essential for the proper working and preservation of all cams that they be kept lubricated.

Dismounting and Assembling by Soldier.

The bolt and magazine mechanism can be dismounted without removing the stock. The latter should never be done except for making repairs, and then only by some selected and instructed man.

To Dismount Bolt Mechanism.

1. Draw the bolt fully to the rear, then place the piece across hollow of left arm.

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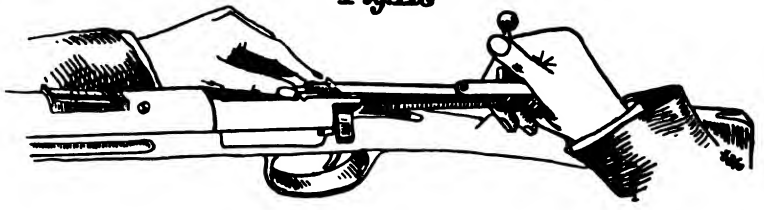
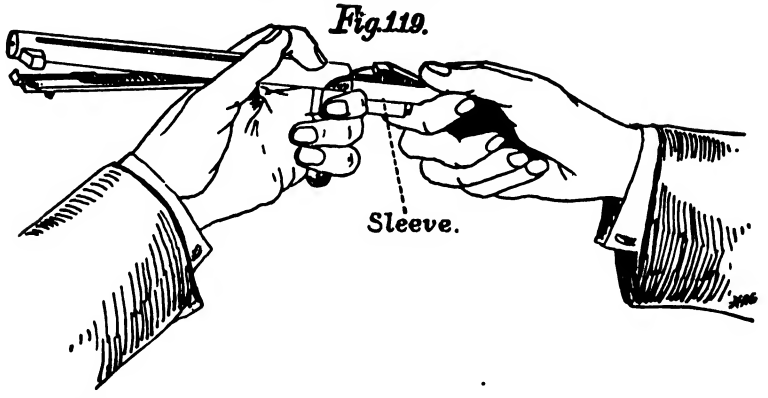
2. Lift the front end of hook of extractor off bolt with left thumb and at the same time turn bolt handle to left with right hand (Fig. 118). The bolt can then be drawn from the receiver.

Fig. 118



3. Take bolt handle in left hand, back of hand down, bolt upside down. Grasp the cocking piece with right hand (Fig. 119).

Fig. 119.



4. Slightly draw back cocking piece and turn it towards the operator until the firing pin can be removed from the bolt.

5. Take firing pin in left hand and bear down on point of striker with right thumb until it leaves the firing pin; remove main spring from firing pin and the latter from sleeve.

To Assemble Bolt Mechanism.

1. Observe that the safety lock is turned to the left. Reverse the order of the steps of fifth operation in dismounting.

2. Grasp the bolt handle in left hand as in third operation in dismounting, and the firing pin in right hand, extractor uppermost. Insert firing pin in bolt.

3. Grasp handle of bolt with fingers of both hands, bolt directed downward, and with both thumbs on the rear of safety lock (Fig. 120), push strongly forward and turn to right with thumbs until the arm of the sleeve engages the collar of the bolt.

4. Grasp bolt and cocking piece as in third operation for dismounting. Draw back and turn cocking piece from the operator until its nose enters the notch on the rear end of the bolt (Fig. 119).

5. Take bolt in right hand and introduce it into the receiver, keeping

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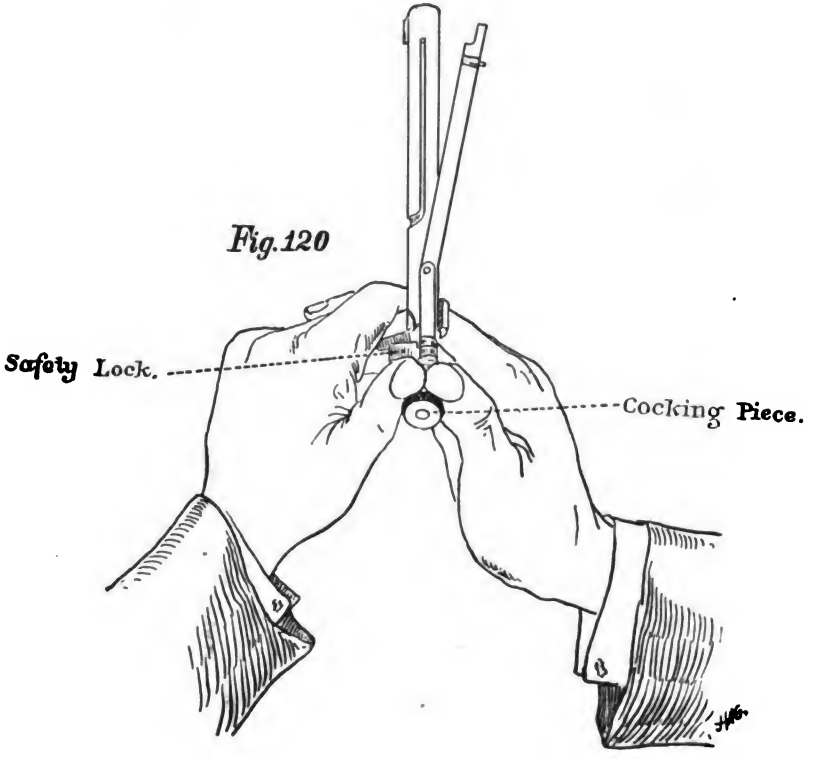
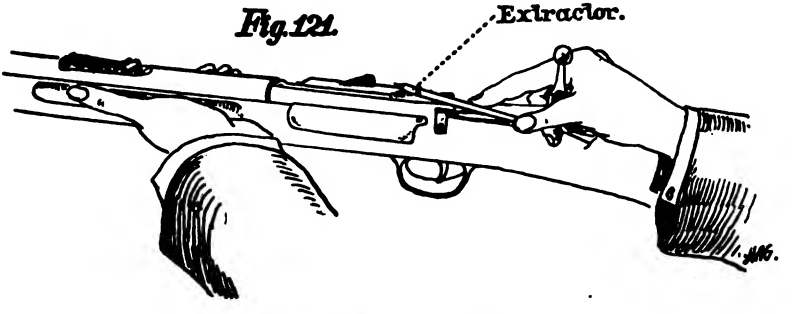


the extractor lifted with the right thumb (Fig. 121). Turn bolt to right and at the same time press strongly with first finger against right side of extractor.



To Dismount Magazine Mechanism.

1. The gate being closed, engage the flanged head of a cartridge case under the lug on the front end of the hinge bar head and turn the latter toward the gate, out of its seat; then bear heavily on the gate with the palm of the right hand, to overcome the pressure of the magazine spring, and, with the left, press forward against the lug, drawing the hinge bar pin from the receiver.

2. Remove the gate, magazine spring, and carrier and follower.

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To Assemble Magazine Mechanism.

1. Hold the piece with right side uppermost. Insert arbor of carrier into its hole in receiver and place end of left thumb across magazine to prevent carrier swinging into the latter.

2. Place magazine spring in its channel, convex side up, rounded end to the rear, particularly observing that the lip at its front end rests in the notch on heel of carrier.

3. Place gate in its seat, lug entering between carrier and magazine spring. Remove left thumb and at the same time press gate against magazine spring with right hand.

4. Insert hinge bar pin in front hinge hole in receiver with left hand, and press gate down strongly until the pin can be pushed through gate into rear hinge hole.

5. After the hinge bar pin is fully home, turn the head into its seat by opening the gate.

To Complete Dismounting.

Not to be done by Soldier.

The bolt and magazine mechanisms having been dismounted, proceed as follows:

1. Remove upper band screw and slip band forward off barrel.

2. Loosen lower band screw, remove band.

3. To remove the hand guard, raise the leaf of the rear sight to its vertical position and move the slide to top of leaf, force hand guard springs off barrel by screw-driver blades inserted between guard and stock, then turn guard across barrel and remove it over top of sight leaf.

4. Remove guard screws and guard.

5. Remove receiver and barrel from stock.

6. Remove side plate screw, then side plate by pushing out the rear end, until free from the receiver, and drawing it to the rear.

7. Remove ejector pin by means of its knob, then ejector.

8. Press trigger forward until nose of sear is withdrawn from its slot in receiver; then bearing against right side of sear, push it out of its seat.

9. Turn cut-off until point of spring spindle rests on ridge in spring spindle seat of receiver. A light tap on front edge of thumb-piece will remove the cut-off. The point of the spring spindle will rest on the ridge when the spring will not turn the cut-off up or down.

10. To remove safety lock, turn it vertical and strike the front face of its thumb-piece a light blow.

The rear sight leaf should never be removed from the base nor the base from the barrel except for making repairs.

The barrel should never be unscrewed from the receiver.

To Assemble after Dismounting.

1. Safety Lock. Introduce the point of the tang of a small file, or

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any tool of similar size and shape, between the thumb-piece and the spring spindle, thus compressing the spring and forcing the spring spindle into the thumb-piece; insert the safety lock spindle in its hole in the sleeve, the thumb-piece being held vertical, push the safety lock forward, gradually withdrawing the tool.

2. CUT-OFF. Insert its spindle, the thumb-piece turned down into the cut-off hole in the receiver, until the spring spindle strikes the receiver; then with the blade of a screw-driver, force the spring spindle into its hole in the thumb-piece and push the cut-off into place. Care must be taken that the flattened and not the straight sides of the spring spindle bear on the curved surface of the recesses in the receiver.

3. SEAR AND TRIGGER. Insert the spring in its hole in the sear, start the hinge of the sear into its seat in the receiver, and with a blade of the screw-driver, compress the spring in its hole until the sear can be pushed into place.

Reverse and follow in inverse order the other operations of dismounting.

CLEANING AND CARE OF THE ARM.

As the residuum of smokeless powder, if not completely removed, corrodes the bore in a short time, care is required in cleaning the arm after firing.

To clean the barrel, insert in the chamber a cartridge shell, the front end of which has been filled with a wooden plug, and close the bolt; clean the bore with rags saturated with soda water, or, if that is not obtainable, with water; wipe thoroughly dry with clean rags; remove the bolt and cartridge shell; clean and dry the chamber, from the rear, in the same manner; finally oil both chamber and bore with cosmoline oil, leaving a light coating. When the jointed rod is used, remove the bolt, clean half of the bore from the muzzle and the remainder through the receiver, as above prescribed.

If gas escapes at the base of the cartridge, it will probably enter the well of the bolt through the striker hole. In this case the bolt mechanism must be dismounted, and the parts and well of the bolt thoroughly cleaned. Before assembling the bolt mechanism, the firing pin, barrel and undercuts of sleeve, body of striker, well of bolt, and undercut of bolt collar should be lightly oiled.

Many parts can generally be cleaned with dry rags; all parts after cleaning should be wiped with an oiled rag. The best method of applying oil is to rub with a piece of cotton, upon which a few drops of oil have been placed, thereby avoiding the use of an unnecessary amount of oil; this method will, even in the absence of the oiler, serve for the cams of the

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cocking piece, bolt, gate lug, and carrier, and the bearing of the magazine spring on the gate hinge, all of which should be kept lubricated.

Any part that may appear to move hard can generally be freed by the use of a little oil.

The stock and hand guard may be coated with raw linseed oil and polished by rubbing with the hand.

INSTRUCTIONS

FOR REPAIRING U. S. MAGAZINE ARMS,

In the Hands of Troops.

The following component parts only of the Model 1896 and 1898 arms will be issued for repairs in the hands of troops.

RIFLE.

Bayonet.
Bolt.
Butt Plate.
Butt Plate Cap.
Butt Plate Cap Pin.
Butt Plate Cap Spring.
Butt Plate Cap Spring Screw.
Butt Plate Screw, large.
Butt Plate Screw, small.
Butt Swivel.
Butt Swivel Screw.
Carrier.
Cleaning Rod, 1st section.
Cleaning Rod, 2nd and 3rd sections.
Cut-Off.
Ejector.
Ejector Pin.
Extractor.
Extractor Pin.
Extractor Rivet.
Extractor Spring.
Firing Pin.
Follower.
Follower Pin.
Front Sight.
Front Sight Pin.
Gate.
Guard.
Guard Screw, front.
Guard Screw, rear.
Hand Guard.
Hinge Bar.
Lower Band.
Lower Band Pin.
Lower Band Swivel.
Lower Band Swivel Screw.
Magazine Spring.
Main Spring.
Rear Sight Base.
Rear Sight Base Screw, front.
Rear Sight Base Screw, rear.
Rear Sight Base Spring.
Rear Sight Joint Screw.
Rear Sight Leaf.
Rear Sight Slide.
(Includes slide screw and pin.)
Rear Sight Slide Cap.
Rear Sight Slide Cap Screw.
Rear Sight Slide Spring.
Safety Lock.
Sear.
Sear Spring.
Side Plate.
Side Plate Screw.

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RIFLE, Continued.

Sleeve.
Stacking Swivel.
Stacking Swivel Screw.
Stock.
Striker.
Trigger.
Trigger Pin.
Upper Band.
Upper Band Screw.

CARBINE.

(Parts same as in Rifle.)

Bolt.
Butt Plate.
Butt Plate Cap.
Butt Plate Cap Pin.
Butt Plate Cap Spring.
Butt Plate Cap Spring Screw.
Butt Plate Screw, large.
Butt Plate Screw, small.
Carrier.
Cleaning Rod, 1st section.
Cleaning Rod, 2nd section.
Cut-Off.
Ejector.
Ejector Pin.
Extractor.
Extractor Pin.
Extractor Rivet.
Extractor Spring.
Firing Pin.
Follower.
Follower Pin.
Front Sight Pin.
Gate.
Guard.
Guard Screw, front.
Guard Screw, rear.
Hinge Bar.
Magazine Spring.
Main Spring.
Rear Sight Base Screw, front.
Rear Sight Base Screw, rear.
Rear Sight Base Spring.
Rear Sight Joint Screw.
Rear Sight Slide Cap Screw.
Rear Sight Slide Spring.
Safety Lock.
Sear.
Sear Spring.
Side Plate.
Side Plate Screw.
Sleeve.
Striker.
Swivel Screw, rear.
Trigger.
Trigger Pin.

(Parts peculiar to the Carbine.)

Band.
Band Spring.
Front Sight.
Hand Guard.
Rear Sight Base.
Rear Sight Leaf.
Rear Sight Slide.
(Includes slide screw and pin.)
Rear Sight Slide Cap.
Stock.
Swivel.
Swivel Screw, front.

Parts Which Are Most Liable to Require Repair.

BAYONET CATCH NUT.—Works loose and is lost, if the end of the catch has not been well riveted over the nut.

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COCKING PIECE.—Nose worn from neglect to keep it lubricated.

CUT-OFF.—Thumb-piece knocked off by blow, due to form.

GATE.—Lug broken off by escape of gas into the magazine, due to defective cartridges.

HINGE BAR.—Head broken off from blow, or attempt to withdraw it improperly.

LOWER BAND SWIVEL AND SCREW.—Screw, if not riveted in place, works loose and with swivel is lost.

STACKING SWIVEL AND SCREW.—Screw, if not riveted in place, works loose and with swivel is lost.

STOCK.—Bruises, cuts, pieces chipped from different points. Broken at "small."

STRIKER.—Point burned by defective cartridges.

The Replacing of Broken Parts.

BUTT PLATE CAP PIN. This pin has both ends upset; the burr on one end must be filed off and the pin driven out with a drift; when a new pin is put in, its ends must be upset with light blows of a hammer.

EJECTOR. Loosen the guard screws and relieve the close binding of the receiver in the stock; then remove the side plate screw, side plate, ejector pin, and ejector. After inserting the ejector and pin, replace the side plate and screw; then screw the guard screws firmly into place, care being taken not to injure their heads.

EXTRACTOR. Place the sleeve on a wooden block with the extractor rivet over a hole in the block, drive the rivet out with a punch, smaller in diameter than the rivet; remove the old, and enter a new extractor to the proper distance in its slot in the sleeve; then insert the rivet in its hole, and drive it into place by light blows of a hammer.

EXTRACTOR PIN. The small end is inserted from the right, and, when in place, is upset.

FOLLOWER PIN. The small end must be inserted in the hole in the top of the follower, and when driven into place both ends should be upset and all projection of the pin carefully removed.

FRONT SIGHT. As the left end of the sight pin is upset, this burr must be removed with a file, and the pin then driven out from the left side with a small drift. The new sight having been put in the slot, a new pin must be used; its small end is inserted from the right side, and, when in place, the left end should be upset with blows of a light hammer.

LOWER BAND SWIVEL SCREW. This screw, when in place, has its end upset and riveted over the band ear. It should never work loose, if properly assembled, and when it has to be removed to replace an injured swivel, the burr on the end should be filed off and the screw taken out, the end being again upset when the screw has been returned to its place.

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REAR SIGHT BASE. When it may be necessary to remove the rear sight for repairs, it must be done by one thoroughly familiar with the use of the screw-driver, to prevent injury to the head or point of the base screws.

Before replacing the base, the barrel, bottom of the base, and screw holes in the barrel should be carefully cleaned; the screws should be started so as to enter freely the holes in the barrel, and they must be screwed in firmly against the base, but not with sufficient force to strip the threads or break the head.

STACKING SWIVEL SCREW. This must be treated in exactly the same manner as the lower band swivel screw.

TRIGGER PIN. The small end must be entered from the right side of trigger, and when in place, upset on left side.

Injuries Which Do Not Render Parts Unserviceable.

BOLT. The entire flange at the front end may be broken off, except a small portion on the opposite side from the guide rib which is required to support the head of the empty case and cause the case to be drawn to the rear sufficiently far to be acted upon by the ejector.

If automatic ejection be not considered, the entire flange may be dispensed with.

BUTT PLATE. Bruises, cuts, or wearing.

BUTT SWIVEL. Bent.

COCKING PIECE. Moderate wearing of nose. The nose can wear until raising and lowering the bolt handle fails to cock the piece.

EXTRACTOR. Moderate wear or break of edge of hook. Loss of spring.

GUARD. Bent, bruised, or cut.

RECEIVER. Guide lip lost, bent, or loose.

SIDE PLATE. Edges broken, cut through thin part at shoulder near screw hole.

BAR AND RING of Carbine Swivel. Bent.

Using the Arm When Certain Parts of the Bolt and Magazine Mechanism are Wanting.

The parts not essential, or only so to a degree, are the ejector, the extractor spring, extractor pin, safety lock, cut-off, guide lip, gate, carrier, follower, side plate.

The empty cases drawn to the rear by the extractor can be removed from the receiver by the finger.

The safety lock being merely a precautionary device, its absence does not affect the usefulness of the fire-arm. The absence of the cut-off does not affect the use of the arm as a single loader, if the magazine be kept empty, or the feeding can be done entirely through the magazine, which only prevents the latter from being held full in reserve.

The want of one or more of the last four parts enumerated above only prevents the use of the magazine, but in no way affects the use of the arm as a single loader.

The soldier should be taught to appreciate these facts.

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REMARKS.

1. Complaints have not infrequently been made that a main spring is too weak to perform its office, when the fault rests with the soldier, who in sighting inadvertently raised the bolt handle with his hand before pulling the trigger, and thus caused the force of the spring to be expended in closing the bolt, instead of in exploding the cartridge.

2. The cocking piece and gate lug, to prevent wear, must be kept slightly oiled.

3. In assembling the gate, observe that the magazine spring has its lip on top of the heel of the carrier, and not beneath it.

4. The side plate, when removed, must be returned firmly to its bearings, or the width of the cartridge way will be too great to cause the proper feeding of the cartridges.

5. When firing many successive rounds, note must be taken that unburned grains of powder do not collect and pack in the locking lug recess in the receiver, as this will interfere with the perfect closing of the bolt. Such accumulations can be blown out from time to time, or when packed, removed by a knife or the screw-driver.

6. Except when repairs are needed, the following parts will constantly be injured if allowed to be dismounted by the soldier for cleaning; and when repairs are necessary, they should be removed only by a company artificer, or one familiar with the handling of tools and delicate mechanisms, viz:—Cut-off, Extractor, Front Sight, Lower Band Swivel Screw, Rear Sight, Safety Lock.

The rear sight is accurately constructed and fitted carefully to the barrel, and the adjustment of its parts must be preserved to insure correct aiming. If the soldier be permitted to remove these parts, they will become worn and injured, and the closeness of their fit be destroyed.

7. Unless the screw-driver be handled carefully, and with some skill, the screws are sure to be injured either at the head or thread.

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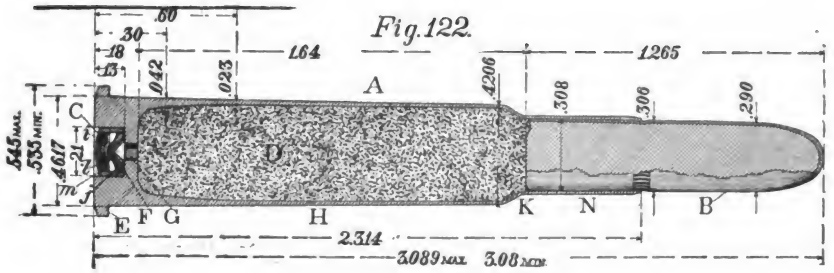
Ammunition for Calibre .30 Arms.

BALL CARTRIDGE.

The Cal. .30, Ball Cartridge, Fig. 122, consists of the *case*, A; *bullet*,



B; *primer*, C; and *charge of smokeless powder*, D.

The case has the *flanged head*, E; the *primer seat*, F; the *hole*, G, through which the flame from the primer composition ignites the powder charge; the *body*, H, which is conical to facilitate the extraction of the empty case; the *shoulder*, K; and the *neck*, N, which is cylindrical: it is made of brass, tinned inside and out.

The initial of the Arsenal, where the ammunition is made, the number of the month and of the year of its fabrication are stamped on the head of each case.

The bullet is non-lubricated and has a core of lead and tin composition, jacketed with cupro-nickel steel; at the front end of the cylindrical portion is a groove into which the mouth of the case is crimped to secure the bullet in place. The core is composed of 1 part of tin and 25 parts of lead by weight; this proportion is varied slightly in order to keep the weight of the finished bullet constant and 220 grains.

The primer is composed of three parts, viz: the *cup*, **i**; the brass *anvil*, **j**; and the tin-foil *disc*, **l**. The cup is made of copper or brass tinned and contains the *composition*, **m**; this is covered and water proofed by the tin-foil disc, **l**. In plan, the anvil is a circle with two small semi-circular portions removed from opposite sides; these two openings form vents for the passage of the flame from the composition to the powder.

The powder is of the nitro-cellulose type; up to the present time three different American powders have been used, viz: Peyton, Du Pont, and W-A. The charge varies with the powder used from 35 to 42 grains.

The primer composition consists of

Fulminate of mercury (moist)	59.37	per cent.
Chlorate of potash	21.89	" "
Glass	15.62	" "
Mealed powder	03.12	" "

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The weight of the cartridge complete varies from 435 to 442 grains, depending upon the weight of the powder charge. Twenty cartridges are packed in a pasteboard box, on the cover of which is stamped the rifle velocity at 53 feet and date of loading; the box and cartridges weigh about 21.5 ozs.; 1,000 cartridges, packed in 50 pasteboard boxes and encased in wood, weigh 78 to 79 pounds.

The standard instrumental velocity, at 53 feet from the muzzle, of this ammunition in the rifle is 1,960 ft. secs., with an allowed variation of but 15 ft. secs. on either side of the standard. This instrumental velocity at 53 feet corresponds to a muzzle velocity in the rifle of about 2,000 ft. secs.

The velocity in the carbine is 80 ft. secs. less than in the rifle.

DUMMY CARTRIDGE.

This consists of a regular service shell containing no powder, a primer with the anvil, but without tin-foil disc or composition, and a bullet which is a regular bullet jacket without the lead core.

It is distinguished from the ball cartridge by its lightness and by three knurled rings around the body in front of the rim.

BLANK CARTRIDGE.

The Blank Cartridge, Fig. 123, consists of the regular service *case*, A;

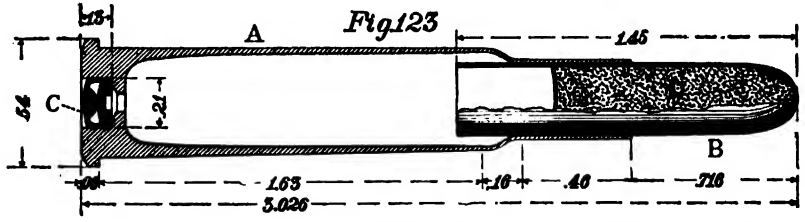

Fig. 123

hollow paper *bullet*, B; and *primer*, C, which is the same as that for the cal. .45 cartridge.

The case is loaded with five grains of smokeless powder to drive the paper bullet out of the bore, to ignite the powder in the bullet, and to produce a sufficiently loud report in firing.

Five grains of smokeless powder, D, are compressed into the interior of the bullet to give the latter the necessary stiffness, and to insure its being broken into fragments when fired.

To prevent the paper bullet from being too susceptible to moisture, the bullet end of the cartridge, after loading, is coated with paraffine.

The blank cartridge weighs about 202 grains, between 34 and 35 weighing one pound. One paper box containing 20 blank cartridges weighs about 11 ounces. One wooden box, containing 50 paper boxes or 1,000 blank cartridges, weighs 42 pounds.

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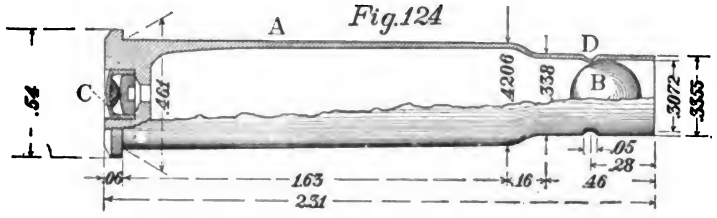
GALLERY PRACTICE CARTRIDGE.

This cartridge, Fig. 124, consists of the regular service *case*, A; the



ball, B; and the *primer*, C, the same as that for the calibre .45 ammunition.

The cartridge is loaded with five grains of black powder.

The *cannelure*, D, forms a seat for the ball and prevents it from falling or being forced into the powder chamber of the case.

The ball, which is spherical, is made of an alloy of 16 parts of lead to 1 of tin: it is lubricated with Japan wax and weighs 42 grains.

The gallery practice cartridge weighs about 232 grains, or about 30 to the pound. One paper box containing 20 cartridges weighs about 12 ounces. One wooden box, holding 50 paper boxes or 1,000 cartridges, weighs 45 pounds and 4 ounces.

MEMORANDA OF TRAJECTORIES.

RIFLE AND CARBINE.

1. RAPIDITY OF FIRE.

42 aimed shots have been fired in two minutes with this arm, used as a single loader, and 43 shots in the same time, using magazine fire.

Firing from the hip without aim, 36 shots have been fired in one minute, using single loader fire, and 35 shots in one minute, using magazine fire.

2. MAXIMUM RANGE.

(Computed *.)

	Maximum Range.	Elevation.	Time of Flight.
	Yards.	Degrees.	Seconds.
Rifle,	4066	44	34.6
Carbine,	4016	44	34.3

* All computations for the "Memoranda of the Trajectories" were made by Lieut. C. L'H. RUGGLES, Ord. Dept.

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3. PRESSURE.

The powder pressure in the chamber of the Rifle and Carbine is about 38,000 pounds per square inch.

4. RECOIL.

(Computed.)

The maximum energy of free recoil of the Rifle is 10.025 foot-pounds, and that of the Carbine 11.827 foot-pounds.

5. ACCURACY.

(Determined by Experimental Firing.)

Radius of Circle of Shots.

Range.	Rifle.	Range.	Rifle.	Range.	Rifle.
Yards.	Inches.	Yards.	Inches.	Yards.	Inches.
100	1.2	700	9.3	1300	21.8
200	2.1	800	11.1	1400	25.0
300	3.3	900	13.0	1500	28.7
400	4.7	1000	14.9	1600	33.0
500	6.2	1100	16.8	1700	38.0
600	7.7	1200	19.1	1800	44.0

6. DRIFT.

The drift proper of the Rifle is to the right, but the passage of the bullet through the bore deflects the muzzle so that the resultant path of the bullet is on the left of the line of sight as given in the following table.

(Determined by Experimental Firing.)

Range.	Rifle. Shoots to the Left.	Range.	Rifle. Shoots to the Left.	Range.	Rifle. Shoots to the Left.
Yards.	Inches.	Yards.	Inches.	Yards.	Inches.
100	2.5	700	14.0	1300	30.6
200	3.7	800	17.2	1400	32.8
300	5.1	900	20.7	1500	35.0
400	6.7	1000	24.0	1600	37.2
500	8.7	1100	26.2	1700	39.3
600	11.1	1200	28.4	1800	41.4

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7. DEVIATION OF THE BULLET.

Produced by a one mile wind normal to the plane of fire

(Determined by Experimental Firing.)

Range.	Deviation. Rifle.	Range.	Deviation. Rifle.	Range.	Deviation. Rifle.
Yards.	Inches.	Yards.	Inches.	Yards.	Inches.
100	0.6	700	8.7	1300	28.8
200	1.3	800	11.1	1400	33.7
300	2.3	900	13.9	1500	39.1
400	3.5	1000	17.0	1600	45.0
500	4.9	1100	20.5	1700	51.6
600	6.6	1200	24.4	1800	58.9

8. ELEVATION.

Range.	Rifle. Computed Angle of Departure.			Rifle. Angle of Elevation Found by Firing with Service Sight.			Carbine. Computed Angle of Departure.		
Yards.	°	′	″	°	′	″	°	′	″
100	0	4	29				0	04	52
200	0	9	43				0	10	33
300	0	15	51	0	9	0	0	17	13
400	0	23	02	0	16	0	0	25	02
500	0	31	35	0	24	0	0	34	14
600	0	41	27	0	34	0	0	44	55
700	0	52	53	0	45	0	0	57	07
800	1	5	47	0	57	0	1	10	47
900	1	20	9	1	11	0	1	25	58
1000	1	36	1	1	26	0	1	42	34
1100	1	53	22	1	42	0	2	00	41
1200	2	12	17	1	59	0	2	20	25
1300	2	32	47	2	17	0	2	41	47
1400	2	55	0	2	36	0	3	04	53
1500	3	19	0	2	56	0	3	29	50
1600	3	44	24	3	18	0	3	56	09
1700	4	12	10	3	42	0	4	25	00
1800	4	41	43	4	9	0	4	55	58
1900	5	14	8				5	29	34
2000	5	49	4				6	05	30

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9. VELOCITY.

The muzzle velocity of the Rifle bullet is 2000, and that of the Carbine 1920 feet per second.

Remaining Velocity.

(Computed.)

Range.	Rifle.	Carbine.	Range.	Rifle.	Carbine.
Yards.	Feet per second.	Feet per second.	Yards.	Feet per second.	Feet per second.
100	1783	1712	1100	792	778
200	1590	1527	1200	755	743
300	1418	1361	1300	721	709
400	1265	1217	1400	688	676
500	1138	1100	1500	657	646
600	1044	1018	1600	628	618
700	978	958	1700	600	591
800	923	905	1800	575	565
900	874	859	1900	550	541
1000	831	816	2000	527	519

10. FORCE OF IMPACT.

(Computed.)

Remaining Energy.

Range.	Rifle.	Carbine.	Range.	Rifle.	Carbine.
Yards.	Foot-pounds.	Foot-pounds.	Yards.	Foot-pounds.	Foot-pounds.
100	1553.4	1432.1	1100	306.4	296.1
200	1235.3	1139.5	1200	278.5	269.6
300	985.2	905.4	1300	253.7	245.4
400	781.9	723.5	1400	231.4	223.6
500	632.8	591.5	1500	210.8	203.8
600	532.6	506.6	1600	192.9	186.6
700	467.4	448.4	1700	175.9	170.6
800	416.3	400.4	1800	161.6	156.1
900	373.3	360.1	1900	147.8	143.1
1000	337.4	325.6	2000	135.6	131.4

11. PENETRATION IN WHITE PINE.

The penetration was found by firing into pine butts constructed so that the bullet passed through alternate sections of pine and air, each 1″ thick.

	PENETRATION.		
	53 Feet from the muzzle.	500 Yards.	1000 Yards.
	Inches.	Inches.	Inches.
Rifle.	45.8	19.85	11.44
Carbine.		17.96	11.02

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12. TIME OF FLIGHT.

(Computed.)

Range.	Rifle.	Carbine.	Range.	Rifle.	Carbine.
Yards.	Seconds.	Seconds.	Yards.	Seconds.	Seconds.
100	.159	.165	1100	2.957	3.041
200	.337	.351	1200	3.349	3.436
300	.537	.560	1300	3.758	3.853
400	.761	.793	1400	4.186	4.289
500	1.012	1.053	1500	4.634	4.747
600	1.288	1.337	1600	5.102	5.221
700	1.585	1.641	1700	5.603	5.724
800	1.901	1.963	1800	6.112	6.251
900	2.235	2.303	1900	6.626	6.807
1000	2.587	2.662	2000	7.231	7.388

13. ANGLE OF FALL.

(Computed.)

Range.	Rifle.	Carbine.	Range.	Rifle.	Carbine.
Yards.	° ′ ″	° ′ ″	Yards.	° ′ ″	° ′ ″
100	0 4 50	0 05 15	1100	3 18 55	3 27 46
200	0 11 19	0 12 17	1200	3 55 38	4 05 33
300	0 19 55	0 21 38	1300	4 36 21	4 47 35
400	0 31 12	0 33 55	1400	5 21 28	5 34 09
500	0 45 55	0 49 37	1500	6 11 29	6 25 33
600	1 4 1	1 08 41	1600	7 5 38	7 21 34
700	1 25 10	1 30 33	1700	8 6 10	8 24 24
800	1 49 4	1 55 12	1800	9 13 5	9 33 43
900	2 15 46	2 22 48	1900	10 27 20	10 50 31
1000	2 45 38	2 53 39	2000	11 49 38	12 14 47

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14. ORDINATES OF TRAJECTORY ABOVE LINE OF SIGHT.

(Computed.)

The ordinates of the 500 and 1000 yard trajectories were found experimentally and were practically identical with those computed.

RIFLE.

Horizontal Distance.	100 yards.	200 yards.	300 yards.	400 yards.	500 yards.	600 yards.	700 yards.	800 yards.	900 yards.	1000 yards.
Yards.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.
100	0									
200	0.46	0								
300	0.99	1.07	0							
400	1.62	2.32	1.88	0						
500	2.36	3.82	4.12	2.98	0					
600	3.23	5.54	6.70	6.43	4.31	0				
700	4.22	7.53	9.69	10.42	9.30	5.99	0			
800	5.35	9.79	13.07	14.92	14.92	12.74	7.88	0		
900	6.60	12.29	16.83	19.94	21.19	20.26	16.65	10.03	0	
1000	7.99	15.06	20.99	25.48	28.12	28.57	26.34	21.10	12.46	0
1100	9.51	18.10	25.54	31.54	35.69	37.66	36.94	33.21	26.08	15.14
1200	11.16	21.40	30.49	38.15	43.95	47.56	48.50	46.41	40.93	31.62
1300	12.95	24.98	35.87	45.31	52.90	58.31	61.03	60.73	57.03	49.51
1400	14.89	28.87	41.69	53.08	62.61	69.95	74.61	76 25	74.48	68.89
1500	16.98	33.05	47.96	61.43	73.05	82.47	89.21	92.92	93.23	89.71
1600	19.27	37.62	54.82	70.57	84.47	96.17	105.19	111.18	113.76	112.51
1700	21.73	42.54	62.20	80.42	96.77	110.93	122.40	130.84	135.86	137.05
1800	24.37	47.82	70.11	90.96	109.95	126.74	140.83	151.89	159.52	163.32
1900	27.23	53.55	78.70	102.41	124.25	143.89	160.83	174.73	185.20	191.83
2000	30.17	59.42	87.51	114.16	138.95	161.54	181.45	198.30	211.75	221.33

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14. ORDINATES OF TRAJECTORY ABOVE LINE OF SIGHT.

RIFLE, Continued.

Horizontal Distance.	1100 yards.	1200 yards.	1300 yards.	1400 yards.	1500 yards.	1600 yards.	1700 yards.	1800 yards.	1900 yards.	2000 yards.
Yards.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.
100										
200										
300										
400										
500										
600										
700										
800										
900										
1000										
1100	0									
1200	18.13	0								
1300	37.79	21.45	0							
1400	59.10	44.68	25.15	0						
1500	82.12	69.52	52.05	29.45	0					
1600	107.06	96.96	81.75	60.90	33.83	0				
1700	134.03	126.37	113.58	95.16	70.55	39.07	0			
1800	162.91	157.85	147.65	131.81	109.78	80.86	44.34	0		
1900	194.24	191.99	184.60	171.57	152.32	126.18	92.43	50.84	0	
2000	226.80	227.58	223.22	212.77	197.11	172.54	143.76	105.16	57.51	0

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14. ORDINATES OF TRAJECTORY ABOVE LINE OF SIGHT.

(Computed.)

The ordinates of the 500 and 1000 yard trejectories were found experimentally and were practically identical with those computed.

CARBINE.

Horizontal Distance.	100 yards.	200 yards.	300 yards.	400 yards.	500 yards.	600 yards.	700 yards.	800 yards.	900 yards.	1000 yards.
Yards.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.
100	0									
200	0.50	0								
300	1.08	1.16	0							
400	1.76	2.53	2.05	0						
500	2.56	4.13	4.46	3.21	0					
600	3.50	6.00	7.25	6.94	4.66	0				
700	4.56	8.13	10.45	11.20	9.98	6.39	0			
800	5.75	10.51	14.02	15.97	15.94	13.54	8.34	0		
900	7.08	13.16	18.00	21.27	22.57	21.49	17.62	10.60	0	
1000	8.53	16.06	22.35	27.07	29.82	30.19	27.76	22.19	13.03	0
1100	10.11	19.23	27.09	33.40	37.72	39.67	38.82	34.83	27.25	15.79
1200	11.84	22.68	32.27	40.29	46.34	50.01	50.88	48.60	42.74	32.99
1300	13.70	26.41	37.87	47.76	55.67	61.20	63.93	63.52	59.51	51.62
1400	15.72	30.45	43.93	55.84	65.77	73.32	78.06	79.66	77.66	71.78
1500	17.91	34.82	50.48	64.57	76.69	86.41	93.33	97.11	97.28	93.57
1600	20.21	39.42	57.38	73.76	88.15	100.15	109.33	115.35	117.76	116.27
1700	22.74	44.48	64.96	83.87	100.78	115.29	126.98	135.51	140.41	141.41
1800	25.46	49.92	73.12	94.73	114.35	131.56	145.95	157.16	164.75	168.42
1900	28.42	55.83	81.98	106.53	129.09	149.24	166.55	180.69	191.19	197.75
2000	31.58	62.16	91.46	119.18	144.89	168.18	188.63	205.89	219.49	229.18

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14. ORDINATES OF TRAJECTORY ABOVE LINE OF SIGHT.

CARBINE, Continued.

Horizontal Distance.	1100 yards.	1200 yards.	1300 yards.	1400 yards.	1500 yards.	1600 yards.	1700 yards.	1800 yards.	1900 yards.	2000 yards.
Yards.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.
100										
200										
300										
400										
500										
600										
700										
800										
900										
1000										
1100	0									
1200	18.92	0								
1300	39.40	22.34	0							
1400	61.56	46.50	26.16	0						
1500	85.47	72.65	54.38	30.42	0					
1600	110.42	99.70	83.68	61.81	33.52	0				
1700	138.04	129.79	116.23	96.81	70.95	39.86	0			
1800	167.71	162.12	151.20	134.41	111.16	82.67	45.39	0		
1900	199.94	197.22	189.17	175.23	154.82	129.15	94.67	52.05	0	
2000	234.44	234.81	229.82	218.93	201.52	178.87	147.37	107.72	58.60	0

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15. DANGEROUS SPACES.

The dangerous spaces were calculated under the assumption that the gun, when fired, is 56 inches above the ground, that the height of a man is 68 inches, that the head of a man on horseback is 8 feet above the ground, and that the gun is aimed at the middle point of the target.

Rifle Against Infantry and Cavalry.

Distance on Line of Sight.	Rising Branch of Trajectory.		Falling Branch of Trajectory.				Maximum Continuous Dangerous Space.		Total.	
			In Front.		In Rear.					
	Infantry.	Cavalry.	Infantry.	Cavalry.	Infantry.	Cavalry.	Infantry.	Cavalry.	Infantry.	Cavalry.
Yards.	Yards.	Yards.	Yards.	Yards.	Yards.	Yards.	Yards.	Yards.	Yards.	Yards.
100	all.	all.	all.	all.	102.49	190.15	202.49	290.15	202.49	290.15
200	all.	all.	all.	all.	109.78	166.27	309.78	366.27	309.78	366.27
300	all.	all.	all.	all.	92.45	132.45	392.45	432.45	392.45	432.45
400	80.39	all.	137.85	all.	72.74	102.50	210.59	502.50	290.98	502.50
500	44.85	176.63	79.95	154.41	56.76	79.24	136.71	233.65	181.56	410.28
600	31.31	108.24	54.70	87.17	43.60	61.11	98.30	148.28	129.61	256.52
700	23.43	79.07	39.99	60.24	34.38	48.31	74.37	108.55	97.80	187.62
800	18.15	61.45	30.88	45.31	27.50	38.83	58.38	84.14	76.53	145.59
900	14.73	49.50	24.59	35.69	22.54	31.74	47.13	67.43	61.86	116.93
1000	12.20	40.85	19.92	28.72	18.76	26.49	38.68	55.21	50.88	96.06
1100	10.28	34.34	16.58	23.75	15.77	22.22	32.35	45.97	42.63	80.31
1200	8.78	29.28	13.84	19.79	13.49	18.99	27.33	38.78	36.11	68.06
1300	7.58	25.26	11.84	16.83	11.47	16.25	23.31	33.08	30.89	58.34
1400	6.60	22.00	10.11	14.43	9.94	13.97	20.05	28.40	26.65	50.40
1500	5.80	19.30	8.77	12.50	8.41	12.07	17.18	24.57	22.98	43.87
1600	5.13	17.09	7.67	10.88	7.38	10.58	15.05	21.46	20.18	38.55
1700	4.56	15.20	6.71	9.51	6.50	9.30	13.21	18.81	17.77	34.01
1800	4.08	13.59	5.90	8.34	5.75	8.19	11.65	16.53	15.73	30.12
1900	3.65	12.17	5.19	7.34	5.11	7.23	10.30	14.57	13.95	26.74
2000	3.28	10.94	4.58	6.47	4.56	6.39	9.14	12.86	12.42	23.80

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15. DANGEROUS SPACES.

The dangerous spaces were calculated under the assumption that the gun, when fired, is 56 inches above the ground, that the height of a man is 68 inches, that the head of a man on horseback is 8 feet above the ground, and that the gun is aimed at the middle point of the target.

Carbine Against Infantry and Cavalry.

Distance on Line of Sight.	Rising Branch of Trajectory.		Falling Branch of Trajectory.				Maximum Continuous Dangerous Space.		Total.	
			In Front.		In Rear.					
	Infantry.	Cavalry.	Infantry.	Cavalry.	Infantry.	Cavalry.	Infantry.	Cavalry.	Infantry.	Cavalry.
Yards.	Yards.	Yards.	Yards.	Yards.	Yards.	Yards.	Yards.	Yards.	Yards.	Yards.
100	all.	all.	all.	all.	100.25	183.63	200.25	283.63	200.25	283.63
200	all.	all.	all.	all.	105.11	158.79	305.11	358.79	305.11	358.79
300	all.	all.	all.	all.	87.83	125.53	387.83	425.53	387.83	425.53
400	69.62	all.	121.72	all.	68.79	96.80	190.51	496.80	260.13	496.80
500	40.74	153.27	73.18	133.24	53.06	74.39	126.24	207.63	166.98	360.90
600	28.95	98.26	50.23	79.07	41.43	57.98	91.66	137.05	120.61	235.31
700	21.57	72.69	37.09	55.82	32.83	46.00	69.92	101.82	91.49	174.51
800	17.01	56.87	28.80	42.33	26.51	37.22	55.31	79.55	72.32	136.42
900	13.81	46.03	22.76	33.22	22.05	30.80	44.81	64.02	58.62	110.05
1000	11.47	38.17	18.76	27.12	18.23	25.54	36.99	52.66	48.46	90.83
1100	9.68	32.22	15.69	22.60	15.28	21.39	30.97	43.99	40.65	76.21
1200	8.28	27.56	13.25	18.96	12.94	18.22	26.19	37.18	34.47	64.74
1300	7.17	23.84	11.32	16.13	11.09	15.63	22.41	31.76	29.58	55.60
1400	6.26	20.82	9.75	13.89	9.54	13.42	19.29	27.31	25.55	48.13
1500	5.50	18.30	8.46	12.01	8.27	11.63	16.73	23.64	22.23	41.94
1600	4.87	16.24	7.37	10.46	7.21	10.16	14.58	20.62	19.45	36.86
1700	4.34	14.46	6.44	9.13	6.31	8.90	12.75	18.03	17.09	32.49
1800	3.88	12.93	5.64	7.99	5.55	7.83	11.19	15.82	15.07	28.75
1900	3.48	11.60	4.95	7.02	4.90	6.90	9.85	13.92	13.33	25.52
2000	3.13	10.44	4.35	6.18	4.34	6.10	8.69	12.28	11.82	22.72

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Principal Dimensions and Weights of the Rifle and Carbine.

DIMENSIONS.	Rifle.	Carbine.	Cadet.
Barrel:	Inches.	Inches.	Inches.
Diameter of bore	0.30	0.30	0.30
Exterior diameter at muzzle	0.62	0.65	0.62
Exterior diameter at breech	0.98	0.98	0.98
Length of bore	30.00	22.00	30.00
Length of travel of bullet in bore	28.239	20.239	28.239
Diameter of chamber, rear end	0.462	0.462	0.462
Diameter of chamber, front end	0.419	0.419	0.419
Diameter of neck of chamber, rear end	0.338	0.338	0.338
Diameter of neck of chamber, front end	0.334	0.334	0.334
Length of body of chamber	1.62	1.62	1.62
Length of shoulder of chamber	0.164	0.164	0.164
Length of neck of chamber	0.486	0.486	0.486
Length of chamber, including throat	2.33	2.33	2.33
Rifling:			
Number of grooves	4	4	4
Twist, uniform, one turn in	10.00	10.00	10.00
Width of grooves	0.166	0.166	0.166
Width of lands	0.0589	0.0589	0.0589
Depth of grooves	0.004	0.004	0.004
Height of front sight above axis of bore	0.85	0.83	0.85
Distance from top of front sight to sighting notch, leaf turned down	22.295	14.295	22.295
Distance from top of front sight to sighting notch, leaf vertical	24.655	16.655	24.655
Bayonet, length of blade	11.73		8.73
Stock:			
Length with butt plate	46.05	30.05	46.05
Crook, *i. e.*, distance from axis of bore to heel of butt	1.85	1.85	1.85
Distance from trigger to butt plate	13.37	13.37	13.37
Arm complete:			
Length, without bayonet	48.9	40.9	48.9
Length, with bayonet fixed	60.7		57.7

WEIGHTS.	Pounds.	Pounds.	Pounds.
Barrel	3.117	2.528	3.117
Bayonet	0.997		0 843
Butt plate	0.277	0.277	0.285
Receiver	1.397	1.397	1.397
Bolt mechanism	0.920	0.920	0.920
Magazine mechanism	0.393	0.393	0.393
Stock	1.840	1.400	1.870
Hand guard	0.078	0.054	0.078
Rear sight, with screws	0.200	0.199	0.200
Cleaning rod	0.217	0.144	
Ramrod			0.236
Total weight of metal parts, including oiler	7.233	6.585	7.177
Total weight of arm, without bayonet	9.187	8.075	9.125
Total weight of arm, with bayonet	10.174		9.994
Weight to compress main spring	*18 to 22	*18 to 22	*18 to 22
Trigger pull off	3 to 6½	3 to 6½	3 to 6½
Bayonet scabbard	0.47		0.375
Cartridge belt, woven	1.11	1.11	1.11
Cartridge belt, woven, filled with 100 cartridges	7.437	7.437	7.437

* Changed in July, 1898, to 16 to 18 pounds.

(12185—Enc. 51.)

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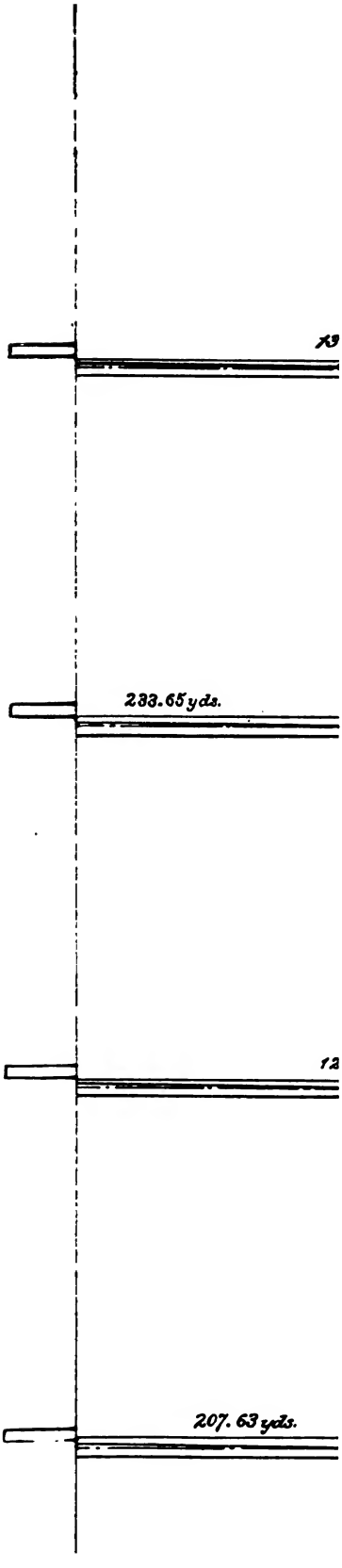

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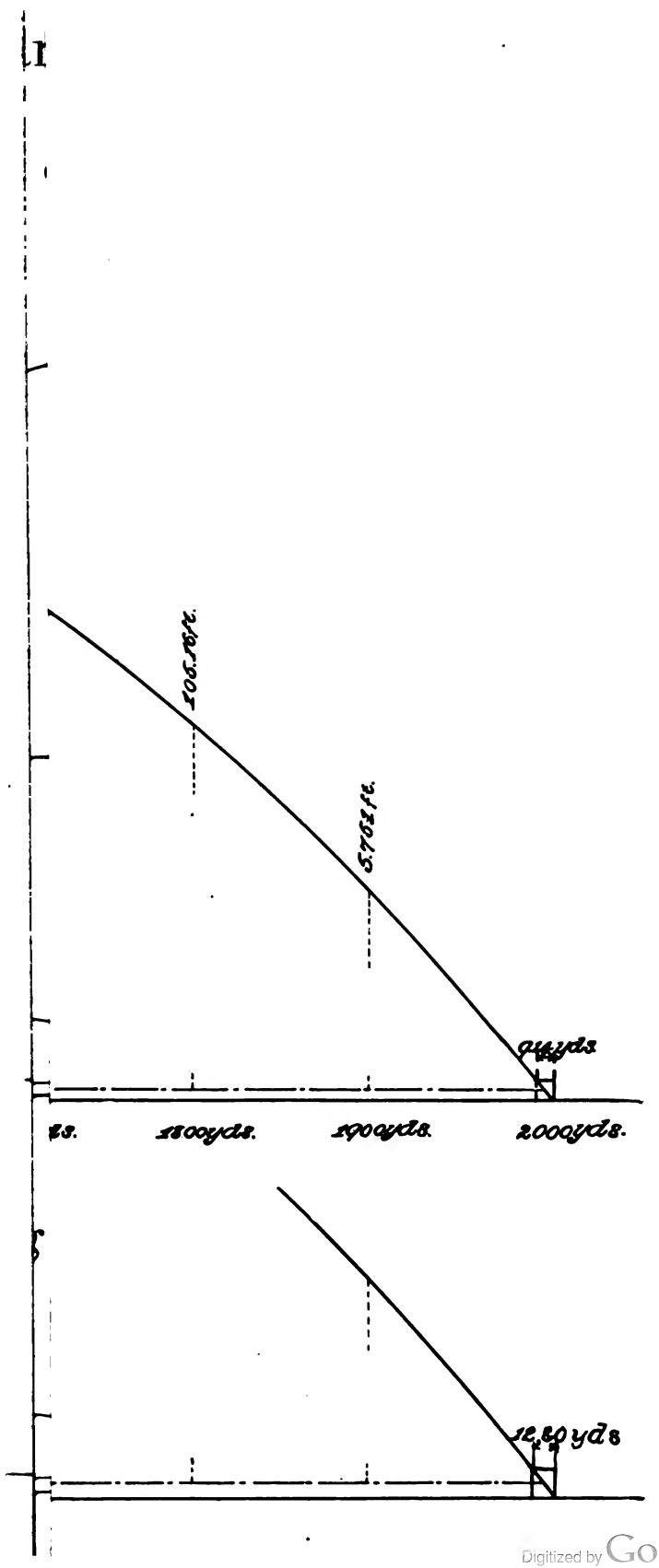

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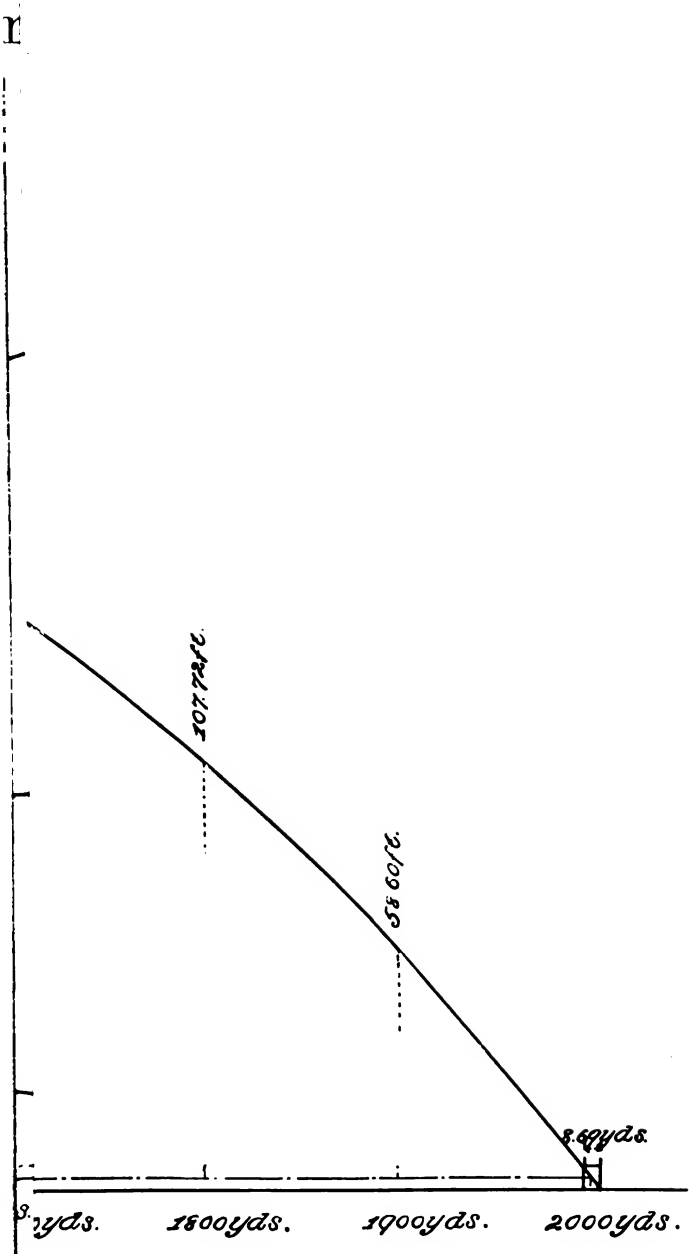

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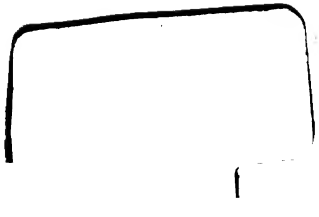

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